APRIL 15, 1933

Railway Age

FOUNDED IN 1856

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35,000,000

Engine Truck Miles on one railroad without a single bearing failure, or locomotive delay due to the engine truck bearings! That is the record to date of 35 Timken Bearing Equipped engine trucks operated by an eastern railway system. The experimental stages are passed. Railroads can confidently anti-frictionize their rolling stock with Timken Bearings.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

TIMKEN

TRADE MARK REG. U. S. PAT. OFFICE

The Modern Locomotive On the Job

WHY THROW GOOD MONEY AFTER BAD?

Old locomotives—

are much more expensive to maintain than new power because repair cost rises steadily with advancing age.

cannot handle heavy tonnage trains at the speeds required today.

show high fuel costs per ton mile.

constitute a "drag" on the entire traffic and prevent the full use of the better locomotives now in operation.

Modern locomotives—

will show low repair costs.

handle twice the tonnage of locomotives of 20 years ago at speeds of 40 miles per hour or over.

give twice the mileage between heavy repairs.

will pay for themselves out of savings within relatively few years and, at the same time, increase the earnings of the property.

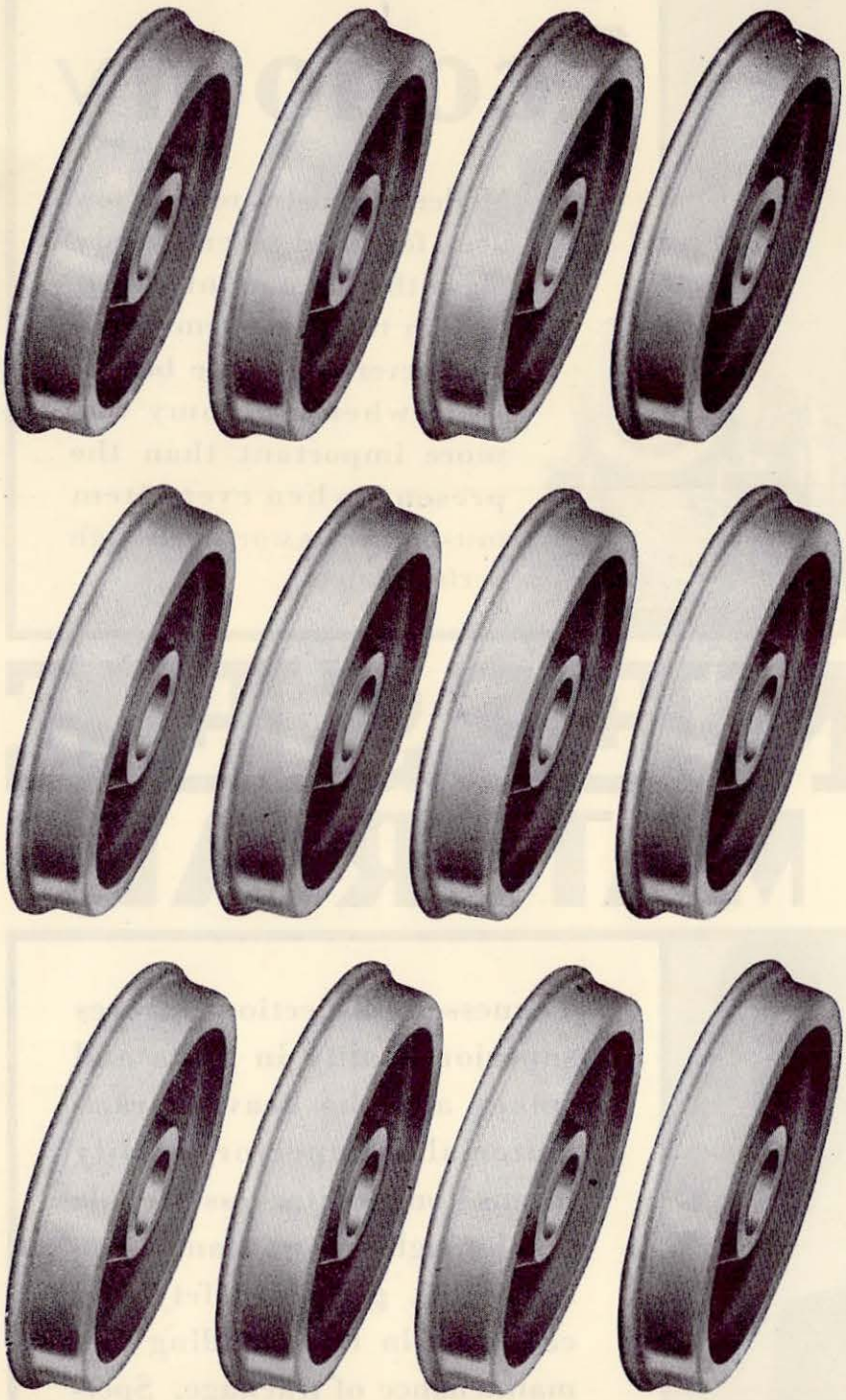
Instead of wasting substantial sums on class 3 repairs to obsolete locomotives, why not use this money as first payment on new locomotives?

More than ever—it takes Modern Locomotives to make money these days!

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA

Published weekly by Simmons-Boardman Publishing Company, 1309 Noble Street, Philadelphia, Pa. Entered as second class matter, January 4, 1933, at the Post Office at Philadelphia, Pa., under the act of March 3, 1879.



WHEEL PROFITS TALK

$

FRANKLY, we want your heavy-duty wheel orders . . . because we know that Armco *Heat-Treated* Wheels assure you plus-mileage and low replacement costs. Experience shows that they keep payloads moving long after ordinary wheels have rolled onto the scrap heap. The steel is pre-tested and sound. Then, to insure high yield point and adequate tensile strength, Armco Wheels are *heat-hardened and oil toughened*. That means more payloads, extra dollar-miles. Still, there is only one way to find out how Armco Heat-Treated Wheels can be figured in terms of actual profits for your road . . . Invite us in to discuss your wheel problems.

ARMCO
WHEELS • SHEETS • PLATES
for *thrifty* railroads

THE ARMCO RAILROAD SALES COMPANY

Subsidiary of
The American Rolling Mill Co.

Executive Offices: Middletown, Ohio

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New York . Philadelphia . St. Louis
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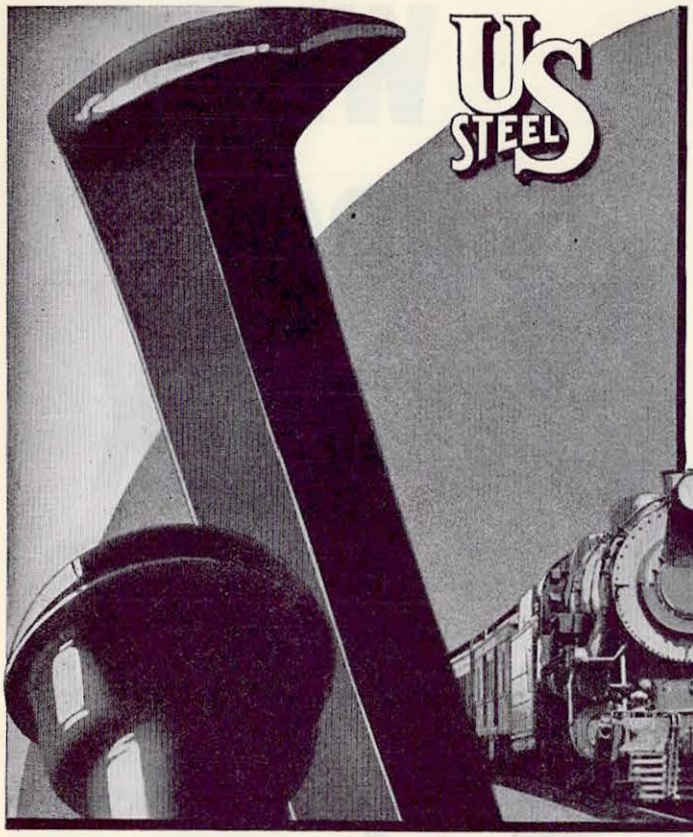
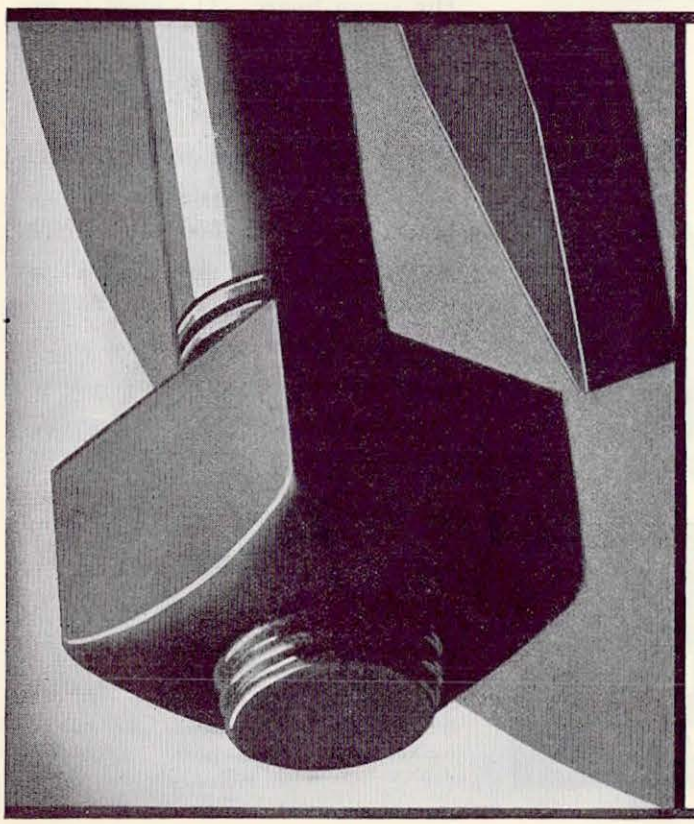


For Safety and Economy

Modern industry reveals few uses for steel where safety plays the paramount part it does in track construction—and never has there been a time when economy was more important than the present, when every item must prove its worth through performance.

TENNESSEE TRACK MATERIALS



Tennessee inspection insures superior quality in bolts and spikes and the heavier track materials. Superior quality means longer life, less trouble on the right of way and, consequently, greater safety and economy in the building and maintenance of trackage. Specify Tennessee quality and be sure you get the best.

Tennessee Coal, Iron & Railroad Co.

General Offices: Brown-Marx Bldg., Birmingham, Ala.

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Railway Age

With which are incorporated the Railway Review, the Railroad Gazette and the Railway Age-Gazette. Name Registered U. S. Patent Office

Vol. 94 April 15, 1933 No. 15

In This Issue

Power Rail Car Has Aluminum Body ..... Page 544

A description of this high-speed, mechanical-drive unit, equipped with rubber-cushioned steel wheels, which has been undergoing tests on Michigan Central tracks in the vicinity of Battle Creek, Mich.

Improved Car Accounting and Statistics at Lower Costs 548

George F. Glacy, comptroller of the Boston & Maine, tells how that road applies card equipment to advantage in car accounting and the preparation of operating statistics.

Railway Inventories Reduced by Almost $450,000,000 553

An unusually-complete compilation of figures on the volume of material and supplies carried in stock and consumed by the railroads.

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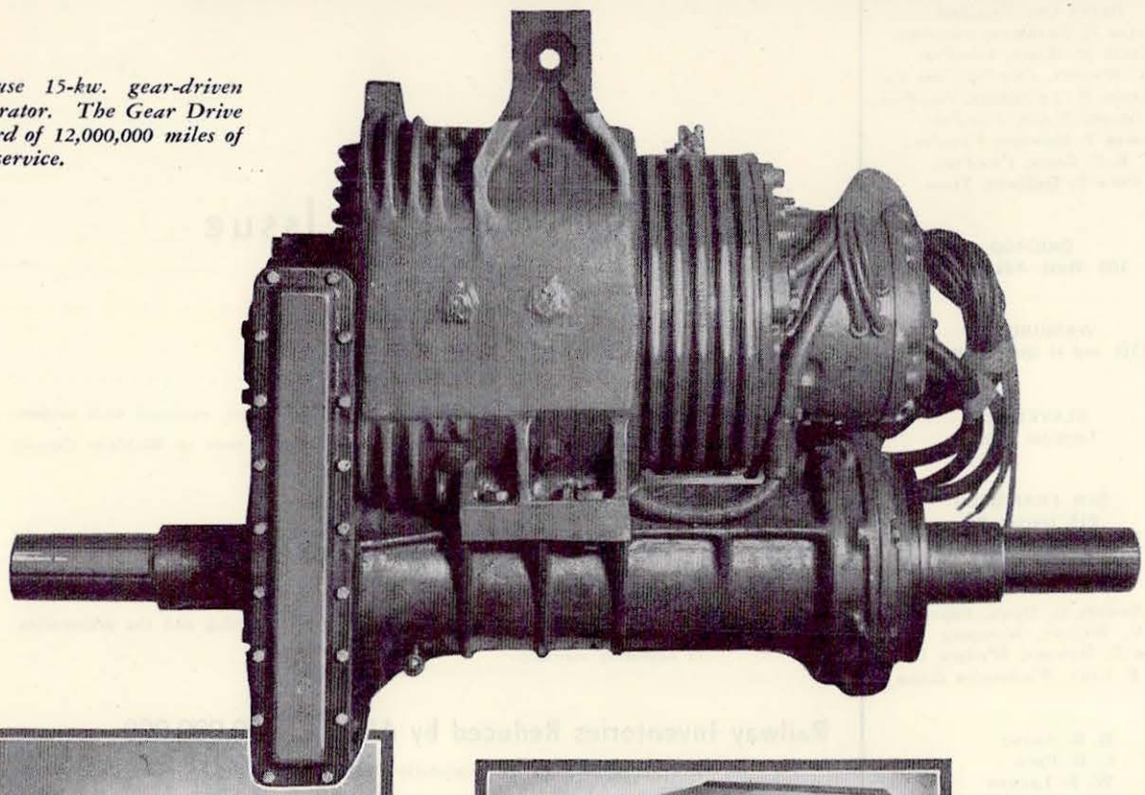
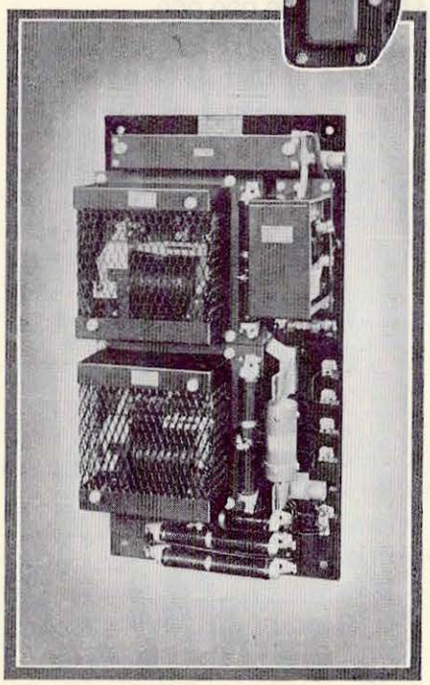
The Railway Age is indexed by the Industrial Arts Index and also by the Engineering Index Service

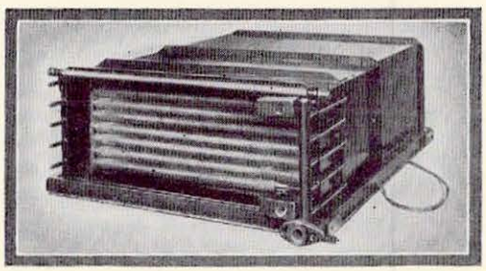
12 MILLION MILES

Westinghouse 15-kw. gear-driven Axle Generator. The Gear Drive has a record of 12,000,000 miles of successful service.

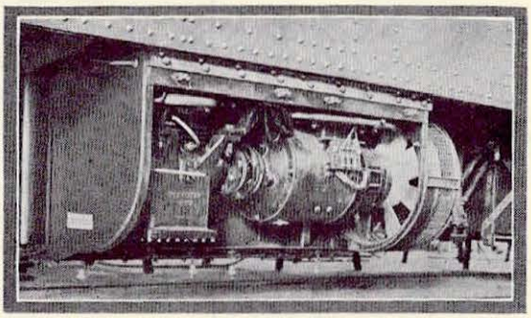




Generator Control—*Only 10¼" deep, 16" wide and 32" high. It fits any standard car lighting control cabinet.*



Air Conditioning Unit—*Designed to fit passenger cars without major alteration to the car structure.*



Refrigerating Unit—*This unit is extremely compact and light. An a-c.—d-c. motor makes possible precooling of cars prior to departure.*

COMPLETE AIR CONDITIONING

OF SUCCESSFUL SERVICE

...*proves*

THE GEAR DRIVE OF *the 15-kw. Axle Generator*

FOR WESTINGHOUSE AIR CONDITIONING

GENERATOR drive, one of the major problems of railway air conditioning, has been solved with the famous Westinghouse WN gear unit, *and the proof of its efficiency and dependability lies in its highly successful 12-million-mile service record!*

Half-way measures are not enough in air conditioning. To be economical and to provide passenger comfort under *all* conditions, ample power must be provided for *continuous* air conditioning, whether the car is stopped, disconnected from the train, high-balling, or creeping into the station.

Westinghouse is the first manufacturer to answer the needs of the railroads with a generator that meets every air conditioning requirement.

The Westinghouse 15-kw. axle generator has the following important advantages:

1. Single reduction gear with slip member.
2. Gears run in oil bath.
3. 100% anti-friction bearings.
4. No brush-shifting mechanisms.
5. Vibrating regulators instead of heavy carbon pile regulators.
6. Ample capacity for *continuous* air conditioning, car lighting and battery charging.

This axle generator is designed as a part of the *complete* system of Westinghouse equipment providing a practical, thorough and economical solution to your air conditioning problems.

Westinghouse

Quality workmanship guarantees every Westinghouse product

SEND FOR INFORMATION

Westinghouse Electric & Manufacturing Company
Room 2-N—East Pittsburgh, Pa.
Gentlemen: Your booklet, C. 1967, Railway Car Air Conditioning Equipment, please.

Name.....
Company.....
Address..... T 79453
City.....*State*..... RA 4-15

EQUIPMENT — FROM RAIL TO ROOF

WHEELS OF CHANCE and WHEELS OF DESTINY

STANDARD "QT"

Quenched and Tempered Wrought Steel Wheels

"Wheels of chance" are out of date even though, through chance, an untreated steel wheel may render unexpectedly long service. Nothing is left *to* chance in Standard "QT" Quenched and Tempered Wrought Steel Wheels. They are quenched throughout and tempered to relieve all internal strains at every point throughout the rim, web and hub. They are wheels destined from the start to provide greater strength, hardness and toughness throughout the structure of the steel. 30,000 placed in service in the last six years prove that they have well *fulfilled* their destiny.

STANDARD STEEL WORKS COMPANY

SUBSIDIARY OF THE BALDWIN LOCOMOTIVE WORKS

GENERAL OFFICES & WORKS: BURNHAM, PA.

NEW YORK CHICAGO PORTLAND AKRON

PHILADELPHIA ST. LOUIS SAN FRANCISCO

THE RAILROADS could be killed too. Short-sighted policies precipitated the banking difficulties. They may precipitate an even more serious railroad break-down. Any factor which paralyzes rail transportation cripples agriculture, industry and trade, as well as credit and investment.

Over-taxation, over-regulation and uncontrolled competition must have prompt consideration if the railroads are to continue. A National Committee has made its recommendations. The report reveals a sorry picture... a picture that must be changed. To allow the source of profits to be killed will *not* cure the situation.

Meanwhile, in the face of heavy odds, the railroads are doing their utmost to work out their own salvation. Today through a newly developed system, they are getting simultaneously a daily record of car locations and a performance analysis of cars, locomotives and trains. The result is a greater average miles-per-car-per-day, heavier car loading, increased tonnage per train. Transportation expenses are being currently adjusted to traffic volume. These are the factors that spell profit or loss to the railroads.

But the railroads can only improve internal conditions. They must look to the outside for help in matters beyond their control. Because railroad rehabilitation vitally affects your own personal welfare, because it is a matter of grave import to the nation, raise your voice in company with other intelligent, protesting business men to the end that railroads be given the same opportunities as other common carriers.

• • •

Mr. George F. Glacy, comptroller of the Boston & Maine Railroad, has just written the story of the most significant accounting development in the last ten years of railroad history. The article sets forth a way to produce car accounting figure controls as a by-product of routine functions, and at a consequently lowered cost. You may have a copy of this story. Simply write to us and ask for it.

POWERS

(PUNCHED CARD)

ACCOUNTING MACHINES

Division of REMINGTON RAND Inc., Buffalo, New York

AMERICAN STEEL SHEETS

FOR ALL KNOWN USES

AMERICAN SHEET AND TIN PLATE COMPANY PITTSBURGH TRADE MARK REG. U.S. PAT. OFF.

In the Railway Field

SHEET METALS of UTILITY and SERVICE, beginning in the metallurgical laboratory and ending with unqualified approval by the ultimate user—have made AMERICAN products a most reliable and satisfactory source of supply. This record for excellence is the user's best assurance also of continued highest standards in sheet steel manufacture in time to come.

KEYSTONE Copper Steel—the original copper steel alloy, is unexcelled for uses requiring the maximum of endurance and rust-resistance. Send for Weight Cards and copy of our interesting "Anti-Corrosive Metal" booklet.

Write for full information on AMERICAN Black and Galvanized Sheets, Formed Roofing and Siding Products, Sheets for Special Purposes, Tin and Terne Plates, Black Plate, etc. This Company also produces U S S STAINLESS and Heat Resisting Steel Sheets and Light Plates.

U S STEEL

American Sheet and Tin Plate Company

GENERAL OFFICES: Frick Building, PITTSBURGH, PA.

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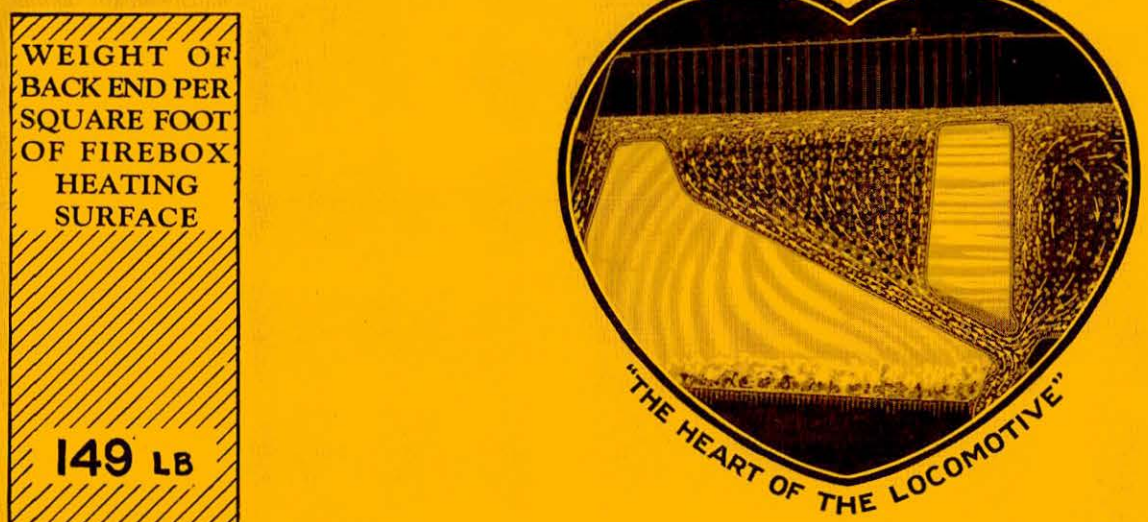
Pacific Coast Distributors—Columbia Steel Company, San Francisco, Calif.
Export Distributors—United States Steel Products Company, New York, N. Y.

SYPHONS *for* Reduced Boiler Weight



Every foot of firebox heating surface carries with it non-productive wrapper sheet, staybolts, radials, braces mudring and lagging.

Every pound of SYPHON heating surface is productive — with maximum efficiency.

SYPHONS are in ideal location for heat transfer (in the hottest zone of combustion). They add matchless heating surface and boiler horse-power at moderate cost, and with minimum weight.

●

All the advantages of Circulation, Fuel and Maintenance Economy, Increased capacity and Safety from Boiler Explosion at no more cost per square foot than equivalent firebox heating surface in the ordinary back end.

LOCOMOTIVE FIREBOX COMPANY
NEW YORK CHICAGO MONTREAL

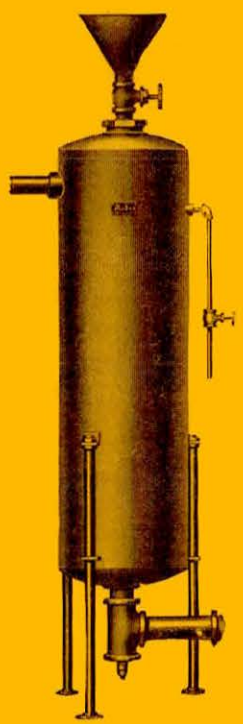
Dearborn

TRADE MARK REGISTERED

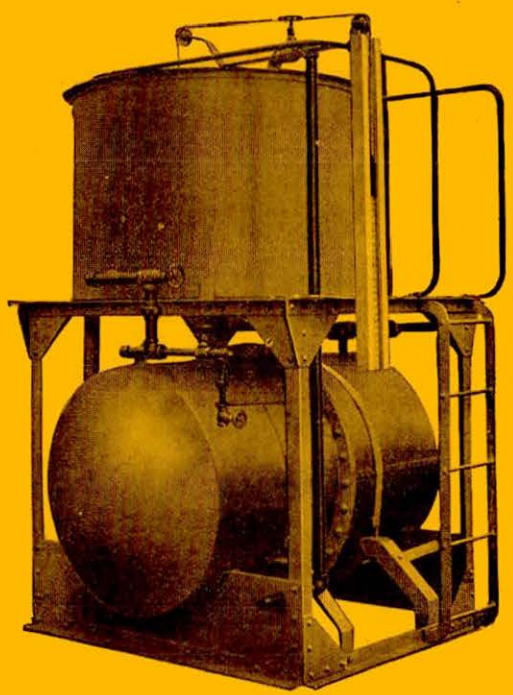
WATER TREATING UNITS

The TRET-O-ROTOR, operated by water pressure, is controlled by an external bearing rotor and injects an exact percentage of treatment into the water line.

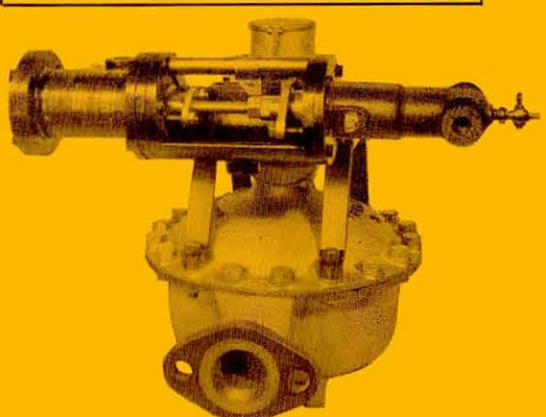
DEARBORN CHEMICAL COMPANY
have **EXCLUSIVE**
Railway Sales Rights
on **TRET-O-UNIT Equipment**
in **U. S. A., CANADA & MEXICO**



DEARBORN TREATING PLANT TYPE C operated by water bypassed from water line.



DEARBORN TREATING PLANT TYPE A—widely used in railway service. Reliable. Inexpensive. Operates on pressure from water lines.



The TRET-O-METER, operated by water pressure, is controlled by a standard water meter and injects the exact percentage of treatment required into the water line.

DEARBORN STATIONARY FEEDER for use with small quantities of treatment.

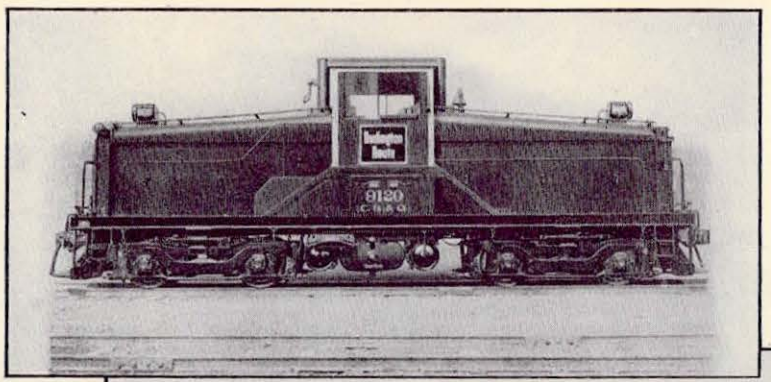
DEARBORN FEEDER TYPE H for use in introducing Treatment to pump suction lines. Also applicable as chemical container for other type feeders.

Operating conditions determine which of these treating units shall be employed in introducing Dearborn Treatment to feed water supplies. All are efficient, reliable and economical in railroad service. Inquiries invited.

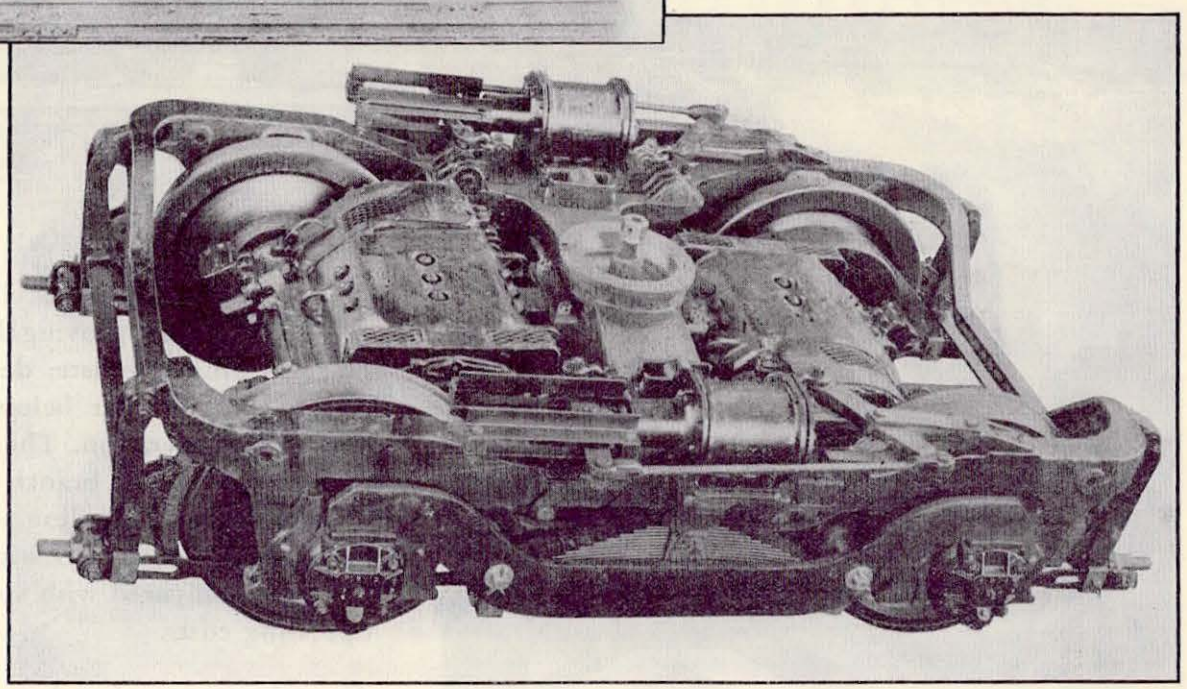
DEARBORN CHEMICAL COMPANY

310 S. MICHIGAN AVENUE, CHICAGO **205 E. 42nd STREET, NEW YORK**
CANADIAN OFFICE and FACTORY: TORONTO

A NEW DESIGN OF QUICK-ACTING CLASP BRAKE



This gas-electric locomotive in service on the C. B. & Q. R. R. is equipped with American Steel Foundries' Unit Cylinder Quick-Acting Clasp Brake.



Each truck carries two air brake cylinders mounted on the truck frame, eliminating all foundation brake connections from the body of the car.

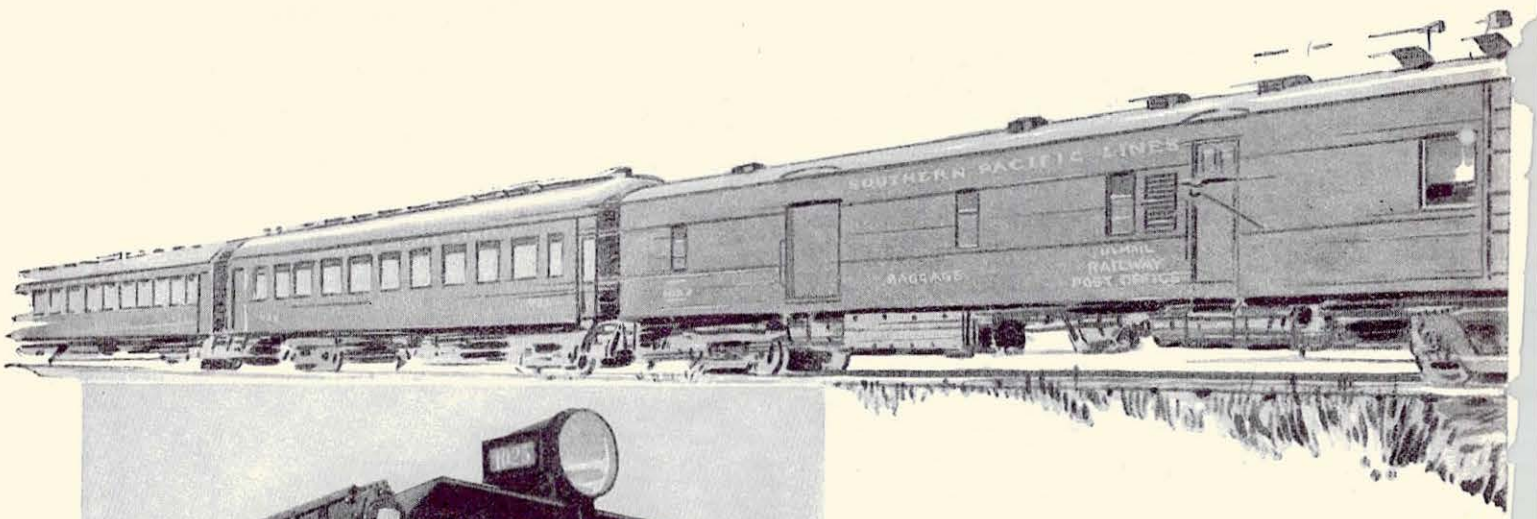
The use of quick-acting unit cylinder brakes on all types of passenger equipment permits faster, closer schedules by increasing the limit of safe speed and making control positive and dependable.

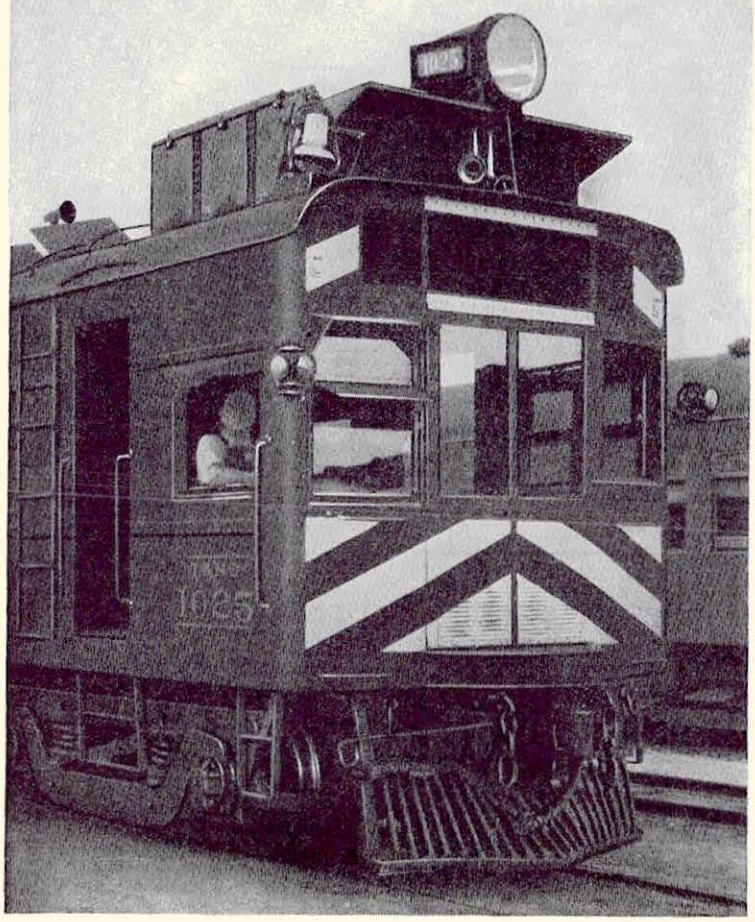
Simplex Unit Cylinder Brakes - skillfully engineered and built to precision standards - make a new definite contribution to efficient, economical and profitable operation in passenger service.

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

AT A FRACTION OF





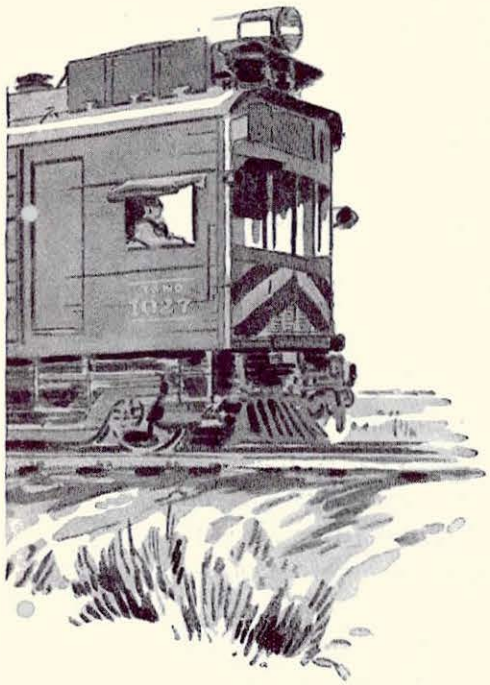
One of the 400-hp. gas-electric rail motor cars of the Southern Pacific Lines in Texas and Louisiana, equipped with G-E generators, motors, control, and air compressors

RAIL MOTOR cars, electrically equipped, are proving their value by furnishing adequate, dependable service at a cost far below that of steam-train operation. Their economies, made both on branch lines and on light-traffic main-line schedules, have been reported as high as 50 per cent, compared with steam-train operating costs.

The advantages of rail motor cars lie principally in their high availability, the use of low-cost fuel, and the elimination of facilities necessary for servicing steam locomotives. This is of vital importance to the railroads because of the reduction in traffic due to competing forms of transportation. There are in service cars ranging in capacity from 150 to 900 hp., convenient units of motive power, adaptable to a wide variety of operating conditions.

GENERAL

STEAM-TRAIN COST



Electrically equipped rail motor cars give efficient, reliable service

THE experience of the Southern Pacific Lines in Texas and Louisiana, in operating gas-electric cars, offers definite proof of motor-car economy. In 1929 and 1930, twelve cars, eight of which were equipped by General Electric, were substituted for steam service. The following is a brief summary of operating results:

	1929	1930	1931
Number of Gas-electric Rail Motor Cars	4	12	12
Total Motor Train Mileage	234,370	989,498	1,060,742
Availability	92.1%	95.3%	96.2%
Total Cost of Operation Per Motor-Train-Mile, Including Maintenance, 6% Interest and 6% Depreciation	$0.3705	$0.3896	$0.3719
Annual Saving Over Comparable Steam-Train Service	$77,225	$307,140	$348,029
Net Return on Investment	39.4%	48.7%	55.2%

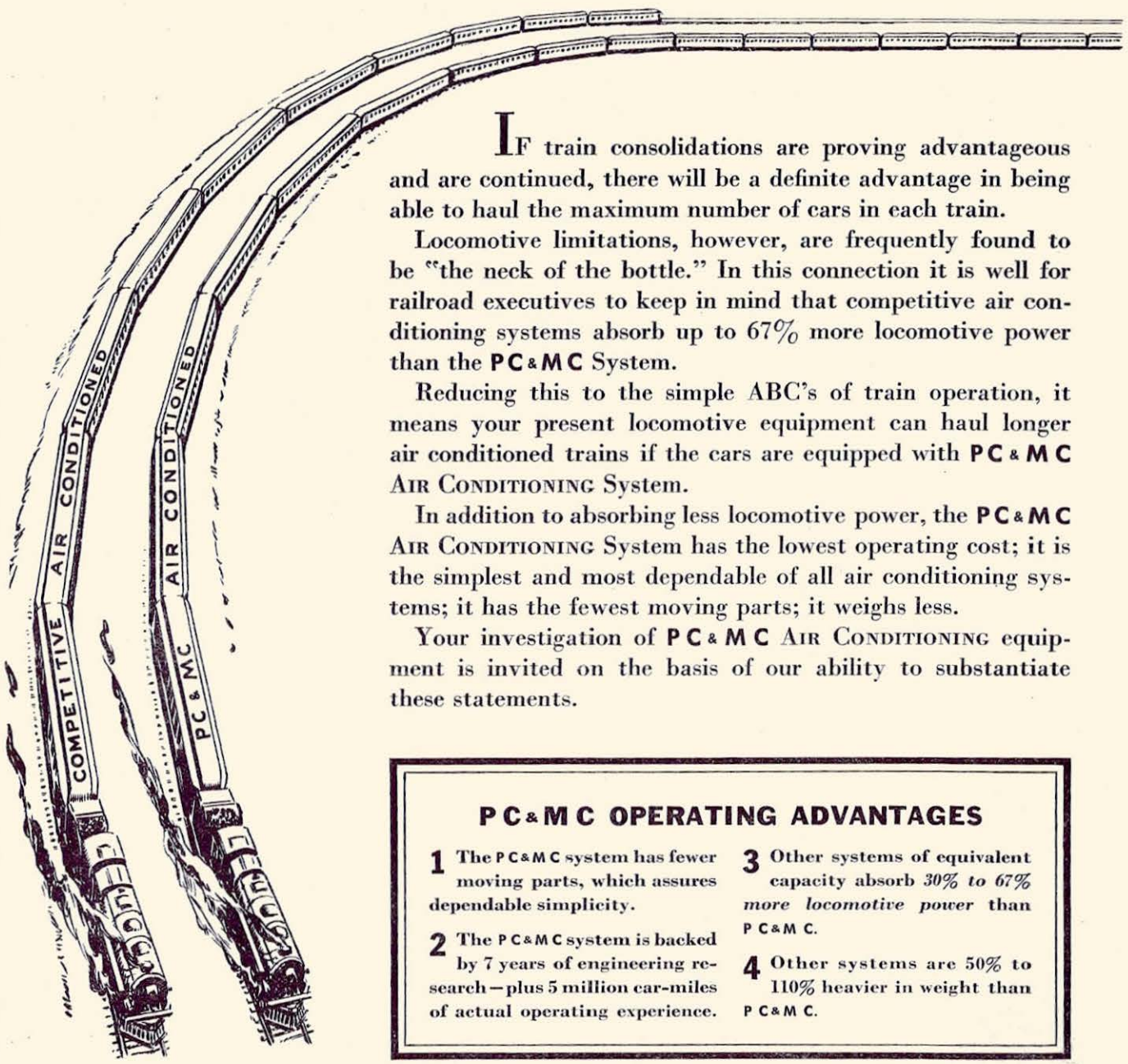
General Electric rail-motor-car equipment, in service on 41 American railroads, has proved its dependability. It is an investment that will pay large dividends for many years to come. General Electric Company, Schenectady, New York.

391-52

ELECTRIC

LONGER TRAINS POSSIBLE!

The PC&MC *Air Conditioning System absorbs less locomotive power!*



IF train consolidations are proving advantageous and are continued, there will be a definite advantage in being able to haul the maximum number of cars in each train.

Locomotive limitations, however, are frequently found to be "the neck of the bottle." In this connection it is well for railroad executives to keep in mind that competitive air conditioning systems absorb up to 67% more locomotive power than the **PC&MC** System.

Reducing this to the simple ABC's of train operation, it means your present locomotive equipment can haul longer air conditioned trains if the cars are equipped with **PC&MC** AIR CONDITIONING System.

In addition to absorbing less locomotive power, the **PC&MC** AIR CONDITIONING System has the lowest operating cost; it is the simplest and most dependable of all air conditioning systems; it has the fewest moving parts; it weighs less.

Your investigation of **PC&MC** AIR CONDITIONING equipment is invited on the basis of our ability to substantiate these statements.

PC&MC OPERATING ADVANTAGES

1 The PC&MC system has fewer moving parts, which assures dependable simplicity.

2 The PC&MC system is backed by 7 years of engineering research—plus 5 million car-miles of actual operating experience.

3 Other systems of equivalent capacity absorb *30% to 67% more locomotive power* than PC&MC.

4 Other systems are 50% to 110% heavier in weight than PC&MC.

PULLMAN CAR & MANUFACTURING CORPORATION

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RUSS BUILDING
San Francisco, Cal.

Washington Sales Office:
MUNSEY BUILDING
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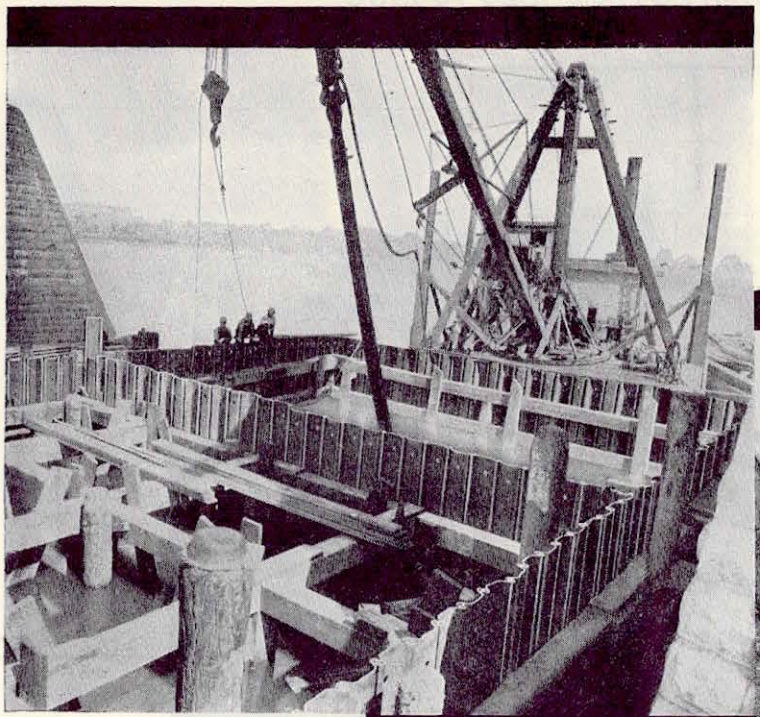
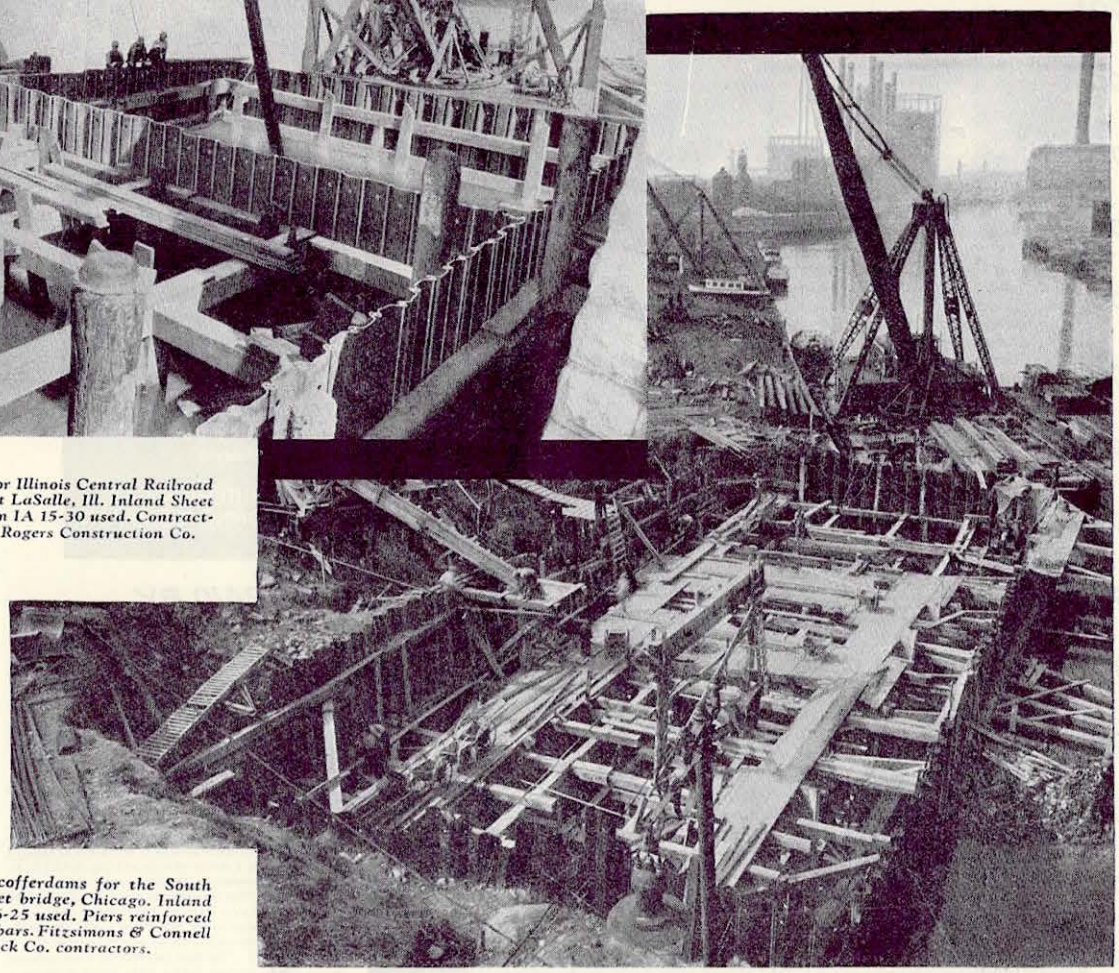
Birmingham Sales Office:
WEBB CRAWFORD BUILDING
Birmingham, Ala.

INLAND Steel Sheet Piling for Cofferdams



Cofferdam for Illinois Central Railroad bridge pier at LaSalle, Ill. Inland Sheet Piling Section IA 15-30 used. Contractors: Bates & Rogers Construction Co.



One of two cofferdams for the South Halsted Street bridge, Chicago. Inland Section ID 16-25 used. Piers reinforced with Inland bars. Fitzsimons & Connell Dredge & Dock Co. contractors.

TYPICAL of numerous cofferdams constructed of Inland Steel Sheet Piling are the two pictured above. For temporary service (as well as permanent) the Inland sections have proved their strength, their adaptability to adverse conditions. They have proved their merit quickly—shown by their use by leading contractors in all sections of the country.

Inland will welcome the opportunity of rendering engineering cooperation on your sheet piling problems, of quoting on your requirements. INLAND STEEL COMPANY, 38 So. Dearborn St., Chicago, Ill.

INLAND STEEL

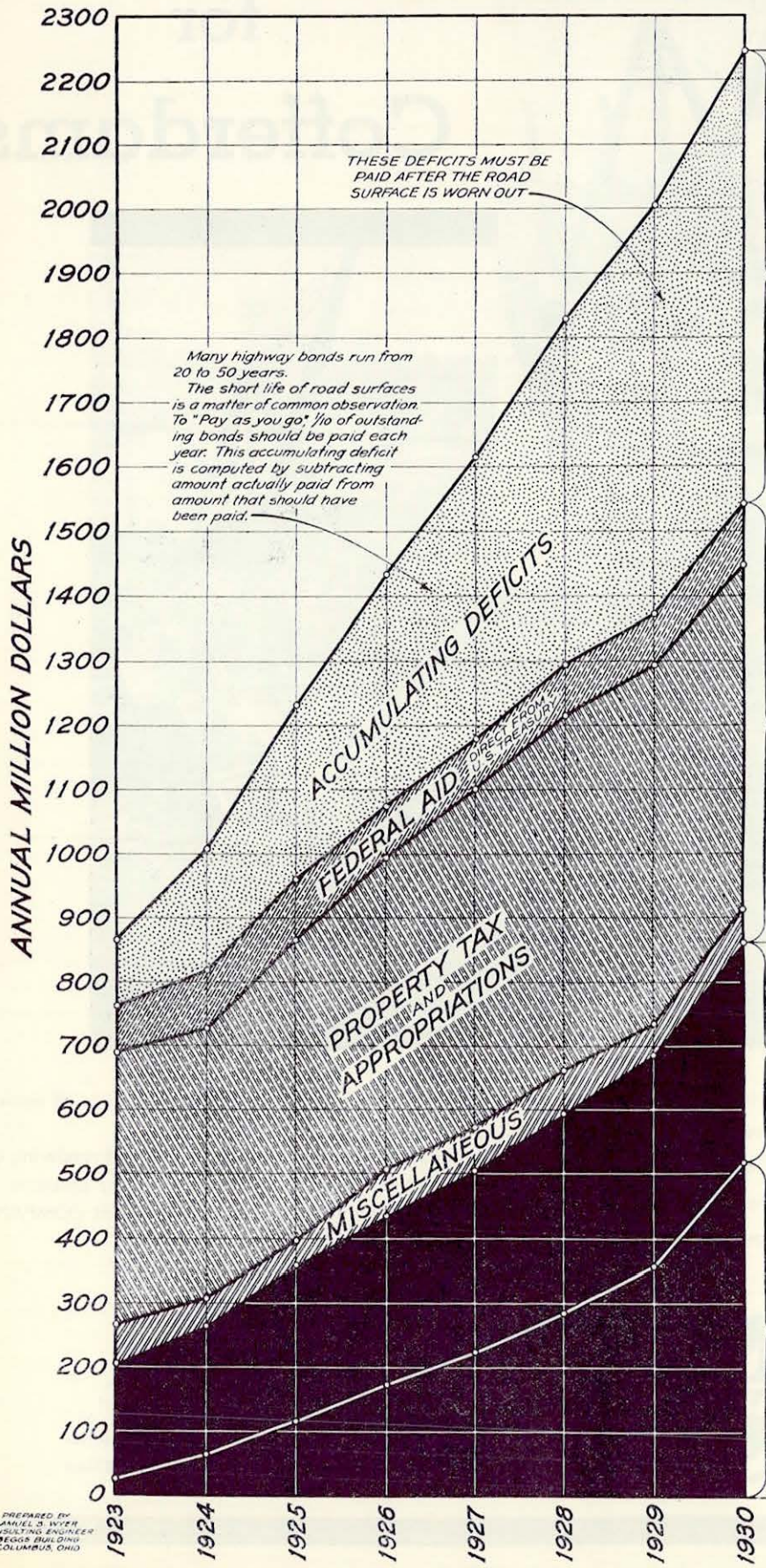
ABLE SERVANT OF THE CENTRAL WEST

Sheets Strip Plates Piling
Bands Structurals
Rails Track Accessories
Bars Rivets Billets

PUBLIC'S INTEREST IN PROTECTING ITS HIGHWAYS

"USER'S" AND "PUBLIC'S" RELATIVE CONTRIBUTION TO RURAL HIGHWAY COSTS IN THE UNITED STATES FROM 1923 TO 1930

BASED ON DATA FROM U.S. BUREAU OF ROADS



PREPARED BY SAMUEL D. WYER CONSULTING ENGINEER BEGGS BUILDING COLUMBUS, OHIO

DOLE FROM FUTURE PAYERS

A two billion dollar annual taxbill that should be lifted from the taxpayer and placed where it belongs—on the users of our public highways. Let them assume the burden: Stop forcing the taxpayer to provide a place of business (*our highways*) for the transportation of freight by truck. (*Includes all highways.*)

HUTCHINS CAR ROOFING COMPANY

PAID BY PRESENT TAXPAYERS

PAID BY PUBLIC

In 1930 this was 1385 million dollars

PAID BY USERS

In 1930 this was 862 million dollars

U. S. Supreme Court views on Protecting Public's Highways

1. "The streets belong to the public and are primarily for the use of the public in the ordinary way. Their use for the purpose of gain is special and extraordinary and generally at least, may be prohibited as the Legislature deems proper."
2. "A distinction must be observed between the regulation of an activity which may be engaged in as a matter of right and one carried on by government suffrage or permission."
3. "The movement of motor vehicles over the highways is attended by constant and serious dangers to the public and is also abnormally destructive to the ways themselves."
4. "The mere fact that the truck company may not make a profit unless it can use a truck with load weighing 22,000 or more pounds does not show that a regulation forbidding it is either discriminatory or unreasonable."
5. "In view of the many decisions of this Court there can be no serious doubt that where a State at its own expense furnishes special facilities for the use of those engaged in commerce, inter-state as well as domestic, it may exact compensation therefor."
6. "Common carriers for hire who make the highways their places of business may properly be charged an extra tax for such use."
7. "There being grave dangers incident to the operation of motor vehicles, a State may require users of such vehicles on public highways to file contracts providing adequate insurance for the payment of judgments recovered for certain injuries resulting from their operation."
8. "In advance of the operation of a motor vehicle on its highways by a non-resident, the state may require him to appoint one of its officials as his agent on whom process may be served in proceedings growing out of such use."
9. "To exclude unnecessary vehicles—particularly the larger ones commonly used by carriers for hire, promotes safety and economy. State regulation of that character is valid even as applied to interstate commerce, in the absence of legislation by Congress which deals specifically with the subject."

RAILWAY AGE

Two Railroad Crises—1917 and 1933

The railroads were confronted with the greatest crisis in their history up to that time at the end of 1917. They are confronted with perhaps an even greater crisis now. The crisis in 1917 resulted in the adoption of government operation. The crisis in 1933 apparently will result in the creation of a government co-ordinator who will have broad authority over railway operation.

The conditions that precipitated the crisis in 1917 and those that have precipitated the present crisis have some similarities, but numerous and remarkable dissimilarities which constitute a striking commentary upon the economic changes in general, and the changes in the transportation situation in particular, which have occurred in the United States within the last 15 years. There are published herewith incomplete summaries of the conditions causing and attending the railroad crises in the last quarter of 1917 and in the first quarter of 1933.

Last Quarter of 1917	*First Quarter of 1933*
1. National emergency due to war.	1. National emergency due to depression.
2. Railroad financial crisis.	2. Railroad financial crisis.
3. Excessive competition between railroads.	3. Excessive competition between railroads.
4. Practically no competition with railroads.	4. Universal water and highway competition with railroads.
5. Unprecedented congestion of traffic.	5. Unprecedented lack of traffic.
6. Inadequate transportation facilities—freight car shortage December 1, 1917, 117,000 cars.	6. Unprecedented excess of transportation—freight car surplus March 14, 1933, 691,061 cars.
7. Co-ordination of railroad facilities and service demanded to relieve congestion of traffic.	7. Co-ordination of railroad facilities and service demanded to reduce operating expenses because of lack of traffic.
8. Railroad gross earnings larger than in any previous year.	8. Railroad gross earnings smallest for 24 years.
9. Low freight rates and high prices and demand for advances in rates.	9. High freight rates and low prices and demand for reductions in rates.
10. Low railroad wages and demands for increases.	10. High railroad wages and demands for reductions.

What of the Future?

Nothing could better illustrate than do the contrasts in these two summaries of conditions the impossibility, in a vast, unwieldly country such as the United States, of basing government or business policies upon long-range forecasts with any reasonable confidence that the forecasts, and the policies based upon them, will prove well-founded. There was a national emergency in 1917 due to war, as there is a national emergency now due to depression. There was a railroad financial crisis then as now. The railroads in 1917 voluntarily created the Railroads' War Board to reduce their competition and co-ordinate their service in order to enable them to handle the maximum traffic possible, but it was impracticable completely to suppress their competition in 1917, when there was too much traffic; and, of course, it has been more difficult to reduce it enough during the present crisis, when there has been much too little traffic to go around. In every other respect, conditions now are in complete contrast to those of 1917, although now, as then, government coercion in behalf of co-ordination apparently is to be applied.

What of the future? Let those who think they can predict it consider what they would have predicted, or actually did predict, when government control was adopted at the end of 1917. Many, including not a few railroad officers, predicted that government operation would be permanent, because large economies would be effected, the railroads would be unified into a single system that never could be dismembered, only the credit of the government would be equal to financing railroad expansion and improvements that would be needed after the war, etc.,—all of which proved to be wrong. Government operation was terminated on March 1, 1920, under the Transportation act, and, after large advances of both wages and rates within the next six months, government financial guarantees ceased, and private management assumed full responsibility for both operation and financial results.

How History Has Not Repeated Itself

Car shortages had prevailed for four years, and every important provision of the Transportation act reflects the then universally prevalent belief that the nation's vital transportation problem was that of providing sufficient railroad facilities and service to handle a superabundant and rapidly growing traffic. There speedily followed the depression of 1921-1922, causing an unprecedented decline of traffic in 1921, and swift recovery and the largest car shortage in all history in the latter part of 1922 and the early part of 1923. There had never been a decline of freight business in this country that had lasted more than two years, and the decline in 1921-1922 lasted about two years. History apparently was repeating itself. All previous history indicated that traffic would continue to grow rapidly and railroad managements, anxious to abolish car shortages, and acting with the endorsement of very student of economic trends in both public and private life, proceeded with large expenditures for the expansion and improvement of facilities and service. But history, temporarily at least, had quit repeating itself. All the prophets were wrong again. Economic changes of unsuspected importance were reducing the growth of

traffic. Water competition became more effective. Highway competition rapidly developed. Railroad freight business increased the unprecedentedly small amount of only nine per cent between 1920 and 1929. Finally, and almost without warning from authoritative sources, came the great depression, among the unprecedented effects of which has been a decline of railroad freight business three times as great relatively as any that ever occurred before and that already has lasted almost twice as long as any that preceded it.

Railroad Forecasts—Past and Present

Again we ask, "What of the future?" As nothing appeared more certain in 1917, in 1920, or even in 1923, only a decade ago, than that a great expansion of railroad facilities was needed, so now nothing seems more certain to many persons than that existing railroad facilities would exceed future demands for years to come, and that a very large part of them should be scrapped. Will subsequent developments prove they are any nearer right than were those who only a decade ago believed traffic would grow as before and corresponding railroad expansion would be essential?

Developments and conditions in the almost twenty years since the world war began have been widely different from what they were in the twenty years before it began. Readjustments during the depression are tending to re-establish many pre-war economic relationships. In the twenty years between 1894, when the bottom of the depression of the nineties was reached, and 1914, when the war in Europe began, railroad freight business in the United States increased 260 per cent, and this is the best measure of the increase in production and commerce that occurred. Nobody now anticipates any such future expansion in production and commerce; but probably nobody anticipated it in 1894, either. Most persons were excessively influenced in 1894 by immediately preceding developments and existing conditions. Most persons were also excessively influenced in 1917, 1920, 1923 and 1929 by immediately preceding developments and existing conditions. Is it not possible, then, that a few persons, in forecasting in 1933 regarding the railroads, may be excessively influenced by immediately preceding developments and existing conditions? Or have developments during a depression the length and depth of which no prophet predicted perhaps endowed a new generation of prophets with a clairvoyance regarding economic changes that was denied to their predecessors?

Fluctuations in Traffic—Rigidity in Policies

One thing history makes certain—the railroads always have been subject to great fluctuations in the demands made upon them. It seems reasonable to believe, therefore, that there will be great fluctuations in the demands made upon them in the future—that the decreases in their traffic which have occurred within the last four years will be followed by large increases in it, and these by large decreases and increases, and so on, ad infinitum. If this is to be the case, then obviously it is desirable that government policies, the railroad financial structure and railroad management shall be made and kept sufficiently flexible to render possible rapid adjustments of railroad service, operating expenses and rates to changes in economic conditions and fluctuations of traffic. And what have we been confronted with throughout the present depression? Among other things, with inflexible regulation, inflexible wages, large inflexible capital costs, inflexible rates and such great difficulty in adjusting service to a reduced traffic that a form of government control is considered necessary to co-ordinate and reduce service.

There is much more needed for a permanent solution of the railroad problem than co-ordination and reduction of service. Railroads are legally classed as public utilities, but all experience has shown that they are subject to uncertainties and fluctuations in their business far exceeding those to which any public utility is subject. No policy for the railroads will be constructive or long helpful to them or the public which is not predicated upon full recognition of the fact that their business always has been and probably always will be subject to great fluctuations and uncertainties, and that rigidity, whether in its financial structure, its wage structure, its rate structure, or the return it is allowed to earn, and whether due to policies of government or management, will always tend to prevent the railroad industry from prospering enough in periods of prosperity, and to bring it to disaster in periods of depression. The very essence of successful management in most lines of business is rapid adjustment to changes in conditions. This is as true of railroad management as of any other kind of business management—a vitally important fact the past widespread ignoring of which is mainly responsible for the present railway situation.

The Express Agency as a "Co-ordinator"

The suggestion that the Railway Express Agency be called upon to enlarge its activities to include the store-door collection and delivery of l.c.l. freight was, we believe, first publicly made in these columns a few years ago. Since that time the idea has gained many adherents, and the Express Agency is actually performing this service for a number of railroads. Now, in the present emergency when plans are being discussed for wholesale consolidations and "co-ordinators" to reduce competitive wastes in the railway industry, careful consideration might well be given to the experience and qualifications which the Agency possesses for doing simply and surely many things which radical and untried plans can only promise to do.

An obvious place for seeking economies in railroad service is in the handling of l.c.l. freight. In 1931 the average load of an l.c.l. car was barely 2.1 tons. It is not economical transportation measured by any stand-

ard to haul around dead weight ten times the paying load. Moreover, there are excessive terminal and handling costs on this traffic which, added to its light loading, increase its burden on the railways. Consolidators and trucks have been capturing the more attractive portion of this traffic, leaving the remainder to the rail carriers.

We hold no dogmatic opinions on the matter, but should like to raise the question whether the Express Agency might not be called upon to take over this traffic to the great profit of the railroads. Under such operation, instead of five railroads loading five cars, each with two tons of l.c.l. freight for a given point, the Express Agency could load a single car with ten tons. With the traffic pooled, more through cars could be made at points of origin, thus improving the service to shippers and eliminating the costs of intermediate handling. Much station and terminal property could be released, and taxes thereby reduced. A substantial portion of the savings made could be passed along to shippers in rate reductions in order to retrieve traffic from trucks and consolidators, with the probable result that rail traffic and employment would increase.

The need for economy and more traffic is so pressing and the experience and facilities of the Express Agency appear so suited toward achieving these ends that it is to be hoped its possibilities in the premises may be thoroughly explored.

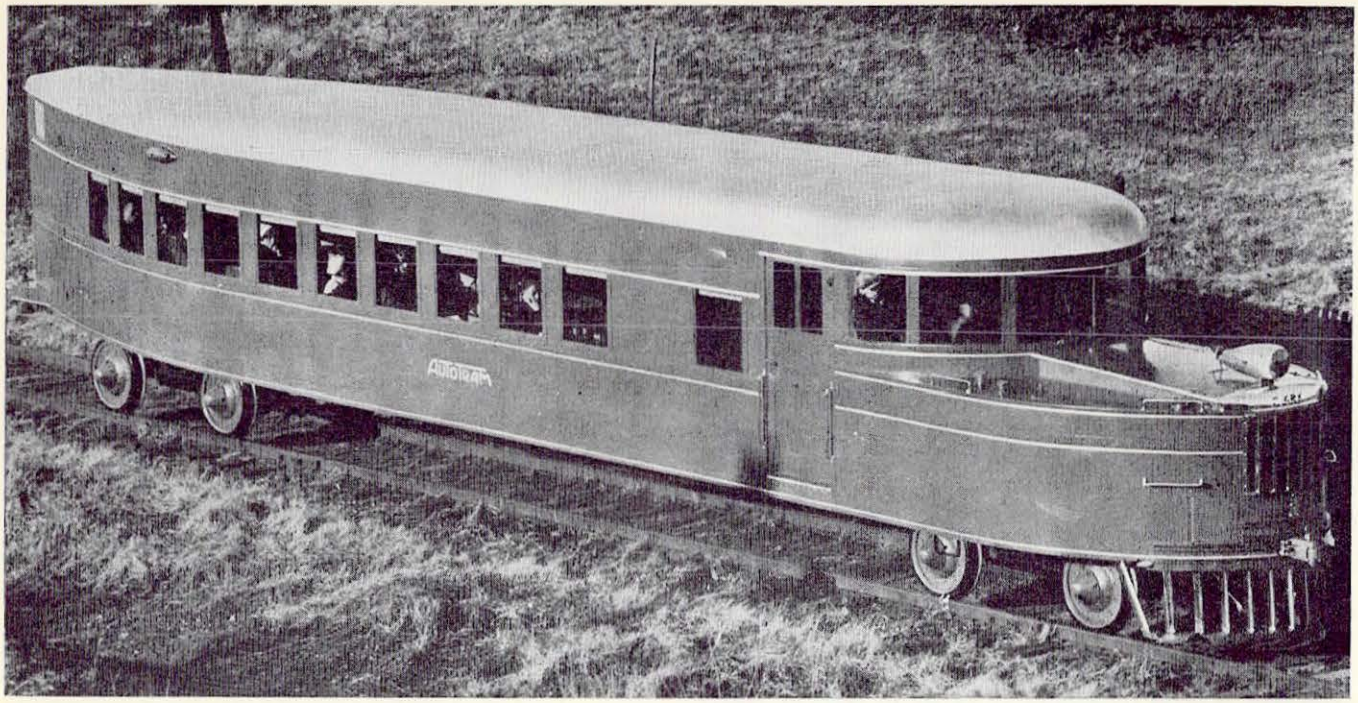
Railway Truck Policies

Several railways in the Southeast will soon offer store-door pick-up and delivery service to shippers and receivers of l.c.l. freight, the pick-up and delivery work being performed, of course, by motor trucks. The hundreds of motor trucks which will be required to perform this additional railway service will not be owned by the railways, however. Instead, they will be owned by local drayage companies in towns where the pick-up and delivery service is to be offered, the railways contracting for the use of the equipment. There is nothing new in this arrangement; nearly all of the railways which have inaugurated store-door collection and delivery along their lines have followed this same practice of contracting for truck service instead of providing and operating truck equipment of their own. But it is not the policy currently being pursued by several roads which have had the longest and most varied experience.

Of the 12,000 motor trucks which it is estimated that the railways are now using in various kinds of freight transport operations, only a small fraction are owned by the railways themselves or by their subsidiaries, the remainder being trucks for the service of which the railways have contracted. There are a number of reasons why most of the railways have seen fit to adopt the expedient of contracting for the truck service which they have required. Originally, the basic reason was that the railways, realizing their lack of experience in truck operation, thought it best to enlist the services of those organizations which had long experience in this business. Another reason was the conclusion of the railways that their truck contractors, with a direct interest in the amount of freight secured by the railways, would become active solicitors for railway traffic. Another important reason has been the disinclination of the railways to make the substantial investments in truck equipment required by truck operation in hundreds of towns over wide areas. For the reasons cited, the first railways to use motor trucks contracted for this equipment. Recognizing them as good reasons and having seen the truck-contracting method working satisfactorily, the railways which later began to use motor trucks adopted the same procedure.

Admitting the validity of the reasons why the railways should contract for truck service, is this the policy which, not only in the long run, but also immediately, will prove most satisfactory to the railways? Lately, evidence has appeared which indicates that economy and better service—the two most fundamental considerations where railroad use of motor trucks is concerned—dictate the adoption of the policy of truck ownership rather than truck contracts. In the December 24 issue of the *Railway Age*, L. B. Young, vice-president and general manager of the Pacific Motor Transport Company, a Southern Pacific subsidiary, said, "After three years' experience with the operation of pick-up and delivery service on the Southern Pacific Lines, the Pacific Motor Transport Company is convinced that, with some exception, it can provide better service, and at less cost, by operating its own trucks than it can by contracting for the work with local draymen." At points where the Pacific Motor Transport Company has installed its own trucks, replacing truck contracts, the savings in expenses have averaged about 20 per cent. The St. Louis Southwestern is another road which has tried both truck contracts and truck ownership. In connection with its store-door pick-up and delivery operation, the Cotton Belt has found that its highway subsidiary, the Southwestern Transportation Company, can pick up and deliver freight at a cost substantially less than that which has to be paid to contract truckers.

The railways which are now contracting for truck service, and those which may expect to do so in the future, will be well advised to consider the experience of the Southern Pacific and the Cotton Belt. The extra services which the railways are offering by means of motor trucks are not inexpensive, and reducing these expenses means just so much greater chance of profit to the railways. Local conditions vary, and what may be a good operating policy at one point may be a bad one at another. But there should be experiments in truck operation to compare the economy and performance of owned trucks and contract-trucks, by every railroad now using trucks in any kind of freight service. The truck-operating policies of the railways should be determined by knowledge, not custom.

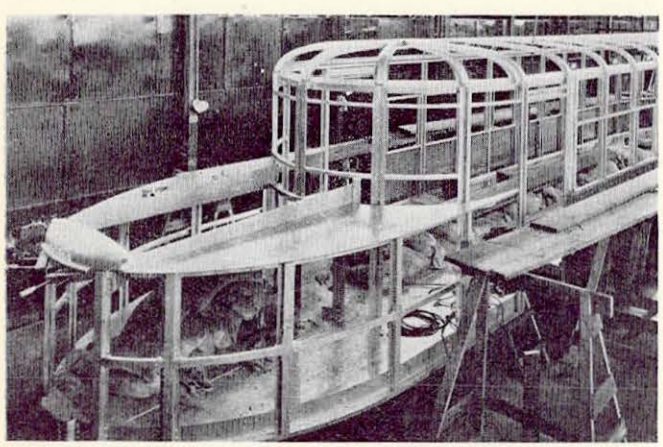


Clark Gas-Mechanical Rail Car with Aluminum Body

Power Rail Car Has Aluminum Body

High-Speed, mechanical-drive unit is partially streamlined and equipped with rubber-cushioned steel wheels

FOR a number of months, a new design of power rail car, provided with an aluminum-alloy body, rubber-cushioned steel wheels, and driven by a 160-hp. gasoline engine with direct mechanical transmission to the front truck wheels, has been undergoing tests on Michigan Central tracks in the vicinity of Battle Creek, Mich. The body of the car is streamlined in one plane only. Rubber is used liberally at several points in the car structure and trucks, as well as in the wheels, to dampen vibration and noise. Dust is excluded by the elimination of ventilators and by the use of stationary, double-plate windows, adequate circulation of clean, heated air being provided by blower fans. Maximum passenger appeal is further assured by attractive exterior and interior color schemes, coupled with thoroughly modern appointments, lighting fixtures, comfortable seats, etc.



Fabricated Aluminum Alloy Plates and Shapes Used in the Body Construction

The new car, built by the Clark Equipment Company of Battle Creek and called the Autotram, has developed speeds up to 85 m.p.h. and is said to make 4½ miles on a gallon of gasoline, at a total operating cost of 25 cents a mile, including 10 per cent depreciation. The car is designed to accelerate from zero to 40 m.p.h. in 52 sec. and stop from 70 m.p.h. in 1,200 ft, or from 35 m.p.h. in 180 ft. In other words, it is expected to meet railroad needs for a rail car which will be not only light, but strong, safe and economical to operate, capable of rapid acceleration and deceleration, high scheduled speeds and, consequently, fitted to provide fast, frequent, low-cost service on main or branch lines and thus recapture some of the passenger traffic now lost to the railroads.

The Autotram is a conspicuous attempt to adapt automotive principles to the requirements of steam railway service. It is a radical departure from previous practice and the first power rail car to embody the exclusive use of Alcoa strong-aluminum alloys in the body construction. The car, which is about 60 ft. long and designed to accommodate 42 passengers, has a light weight of 30,000 lb. As shown in the table, the present aluminum body weighs 16,000 lb., whereas an equivalent body constructed of mild steel would weigh approximately 34,000 lb. This additional weight of 18,000 lb. would necessitate using heavier trucks and a heavier and more pow-

erful motor, so that the total saving in weight which may be credited to aluminum is estimated at 22,500 lb. This would mean a saving of $1,125 a year, based on a transportation or operating cost of 5 cents per lb. per year.

Mechanical Features—Goodrich Composite Wheel

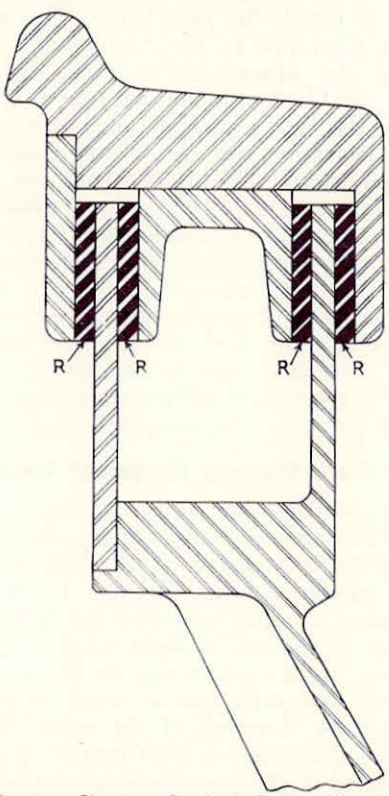
The Autotram is powered with a special Cadillac 16-cylinder, V-type motor which develops 160 hp. at 3,200 r.p.m. This motor is mounted on four aluminum-alloy castings bolted to the car frame. Like all other rotating equipment on the car, it is mounted in live rubber in order to minimize the transmission of noise and vibration to the car framing.

Principal Dimensions and Weights of the Clark Aluminum-Body Rail Car

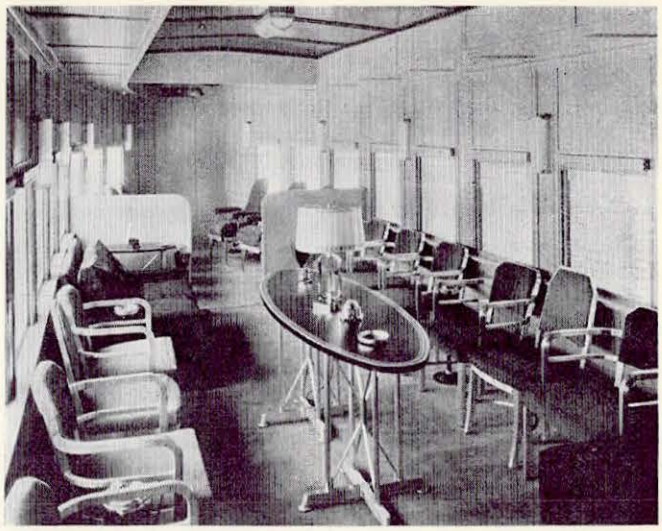
	Data pertaining to the Clark aluminum-body, as built	Estimates based on equivalent mild steel construction
Number of passengers accommodated	42	
Length of car over the end castings	59 ft. 2 in.	.....
Width, overall at eaves	9 ft. 7 in.	.....
Height, overall above rail	11 ft.	.....
Truck centers	40 ft.	.....
Truck wheelbase	6 ft.	.....
Wheel diameter	30 in.	.....
Weight of body and underframe (estimated)	16,000 lb.	34,000 lb.
Weight of steel trucks (estimated)	6,500 lb.	10,000 lb.*
Weight of power plant (estimated)	1,700 lb.	2,700 lb.†
Weight of miscellaneous non-aluminum parts	5,800 lb.	5,800 lb.
Total weight (actual)	30,000 lb.	52,000 lb.
Approximate weight saved by using aluminum	22,500 lb.	.....
Yearly saving in operating cost by reduced weight (calculated at $0.05 per lb. saved per year)	$1,125	.....

* Heavier trucks necessary to carry increased car weight.
† More powerful and heavier motor required.

The drive mechanism utilizes the regular Cadillac transmission, but supplements it with a heavy-duty, multiple-disc clutch developed by the Clark Equipment Company. Behind the Cadillac transmission unit, there is a housing containing a bevel gear connecting the transmission shaft to a vertical shaft leading to the forward truck. The vertical shaft terminates on the truck in a housing which contains another bevel gear and a differential, from which horizontal drive shafts lead to the front and rear axles. All driving is confined to the forward truck.



Sectional Drawing Showing Goodrich Rubber Inserts *RR* in the Composite Aluminum, Rubber and Steel Wheel



Club Seating Arrangement Provided in the First Demonstration Car

The two swivel trucks are made of steel in the present unit and designed so that the car weight is carried on two 4-ft. semi-elliptic, chrome-vanadium springs per truck. Rubber inserts are provided to take the side-bearing thrust. All axles are supported and rotate in Timken roller bearings.

The wheels used in the Autotram are a patented design developed jointly by the Clark Equipment Company and the B. F. Goodrich Company, Akron, Ohio. In these composite, cushion-type wheels, the rubber which provides the resilience is utilized in shear rather than in compression as is customary. The wheel centers are steel castings which are keyed to the solid axles. Two web-plate discs, of $\frac{5}{16}$-in. aluminum alloy, are bolted to these castings and four rubber rings are clamped between the steel tire flange on the inside of the wheel, the aluminum web plates, spacer ring casting and a steel clamp ring on the outside of the wheel. These are so arranged that the only connection between the aluminum web plates and the steel tire is through the rubber rings. All surfaces in contact with the rubber rings are knurled. The stress in the rubber under a wheel load of 8,000 lb. is only 7 lb. per sq. in., and the maximum movement between the tire and axle is only $\frac{1}{64}$ in.

On the left side of the engine compartment there is a 7.5-kw. 32-volt Kohler generator direct connected to a Waukesha engine. This generator provides power for all lighting circuits, air compressor, ventilating blower and signal motor-generator. It is so located that, by means of a hand-operated lever, the engine can be geared to the main-engine transmission, thus providing an emergency power source capable of moving the car at low speed in case of failure of the main engine.

The air compressor is a small electric-powered unit and is mounted on top of the air reservoir. The only air-operated devices on the car are the brakes, horn, cab window wiper, and water-supply system, none of which require a large volume of air.

Automotive-type, internal-expanding hydraulic service brakes with pneumatic control operate on all eight wheels. A hand-operated "holding" or "parking" brake operates on the main engine shaft extension.

The throttle control and the brake control are com-

bined in a unit, the body of which is an aluminum casting. A "dead-man control" feature is incorporated so that removal of the operator's hand from the control lever is immediately followed by automatic closing of the throttle and emergency application of the brakes. All control handles are conveniently located.

Car Body Meets A. R. A. Strength Requirements

The Aluminum Company of America worked closely with the Clark Equipment Company in the development and fabrication of the car body, which conforms to strength requirements specified by the American Railway Association. The box-type, fish-belly center sill, 59 ft. 6 in. long, is built of strong aluminum-alloy plate and shapes, varying in depth from 6½ in. at the ends to 24½ in. at the center. The center sill was designed primarily to provide a maximum deflection consistent with the economical use of material under ordinary static load conditions. As a result, the bending stresses in the girder are low, their maximum being 3,160 lb. per sq. in. Under a buffing load of 100,000 lb., the standard established by the A. R. A. and the post-office department for self-propelled cars operated in trains of less than 200,000 lb. total weight, the maximum combined stress in the center sill of the Autotram amounts to only 7,865 lb. per sq. in., representing a factor of safety of more than 6, based on the ultimate strength of the material.

Side sills are made from 6-in. by ⅜-in. bar and a special extruded Z-section. The floor beams are 4-in. rolled structural channels, riveted to the center and side sills by means of shelf and clip angles. To facilitate ease of assembly and obtain a high degree of strength, special extruded channels are used for body side posts. These channels not only provide the required stiffness and strength, but the two flanges on each post permit both interior and exterior sheathing to be easily attached to the same member. The upper ends of the side posts terminate at a letter-board angle, which is a special extruded section having the proper angularity for riveting the roof carlines to it. Door posts at the rear of the side entrance doors are of a special aluminum sheet. The all-aluminum doors were made by the Morton Manufacturing Company, Chicago.

All window framing is made of extruded aluminum channels designed to permit easy installation and removal of the glass. Each window is fitted with two plate-glass panes set in rubber, the inside pane being shatter-proof. As the car is furnished with controlled ventilation, all windows are stationary except two in the operator's cab, which may be opened to permit rear vision when backing. Dead air in the double window immediately ahead of the driver's position is artificially heated to prevent frost and ice accumulation. All six curved windows in the cab are made of double safety plate glass and afford over 180 deg. of visibility.

The belt rail is a 3½-in. by 5/16-in. bar extending in a single length between the entrance doors and the rear end of the car. Widow ledges and the roof edge anchorage member are special extruded sections. The ⅛-in. side girder plates are of special alloy, this material also being used for the engine compartment sides, deck and removable hatch cover which is reinforced with extruded shapes.

All roof carlines are special extruded channels of aluminum alloy in order to permit cold forming to the desired contour. They are continuous across the width of the car, except at the front and rear. At these points, the channels are spliced at the center line so as to conform with the required streamline contour.

The center and end roof sheets are made of aluminum alloy. Annealed metal is required for the end sheets because it is necessary that these be spliced by welding, then formed to fit the roof contour. The roof sheets are fastened to the carlines and edge molding with small rivets.

Aluminum-alloy sheets are used for the floor, reinforced with 1-in. by 1-in. by ¼-in. angles placed longitudinally between the floor beams. The drop ceiling consists of an angle framework covered with a special aluminum-alloy sheet. The partitions are built of extruded shapes and sheet, and all interior-trim molding is also made of extruded shapes.

By careful preliminary planning, a minimum of shop forming work was required in building the body. The utilization of especially designed extruded shapes assisted greatly in simplifying fabrication and assembly. Furthermore, all material used in the car was chosen for its ease of fabrication, as well as for a high strength-to-weight ratio.

All forming was accomplished without resorting to the use of heat and only the simplest metal-working tools were required. Hot-driven steel rivets were used in most of the assembly work. However, the attachment of the interior side sheets, ceiling, partitions and trim molding was effected by means of self-tapping steel screws. All adjoining surfaces were coated with Albron powder-base aluminum paint. All surfaces were hand-roughened before painting to provide maximum adhesion for the paint.

The car is insulated throughout, including the partitions, with the American Hair Felt Company's Dry-Zero blanket, held in place by No. 1 Lucas cement. A false floor holds the floor insulation in place and also provides the smooth underbody fairing which reduces wind resistance.

All interior and exterior lighting fixtures are aluminum. The headlight, made by the Pyle-National Company, for example, is enclosed in an aluminum streamlined case. Both cooling system manifolds and the radiator cover are aluminum castings. The radiator grille is built up of streamlined tubing and fittings, all chromium plated to match the pilot bars. The main water reservoir was fabricated by the Aluminum Company of America and the aluminum lavatory fixtures were furnished by the Dayton Manufacturing Company.

Included in the club seating arrangement provided in the first demonstration car are several types of Alcoa aluminum upholstered chairs, designed for maximum comfort and light weight. The aluminum tables, with micarta tops made by the Westinghouse Electric & Manufacturing Company, are inlaid with aluminum.

The attractive color scheme of the car, finished in Duco, comprises a light maroon on the exterior, set off by the silver aluminum roof, molding and stripes. The predominant light blue tone in the interior walls and lower ceiling is contrasted with a slate gray upper ceiling giving the impression of increased head-room.

Union Track-Shunting Equipment Installed

Due to the installation of special equipment developed by the Union Switch & Signal Company, the light weight of the Autotram is said not to interfere with reliable operation of automatic block signals. In the past, this lack of reliability of signal operation has been one of the chief obstacles to the use of light-weight rail cars, the difficulty arising from the fact that the contact resistance between wheels and rails may at times be too high to permit satisfactory shunting of the track circuits. In the case of the Autotram, a high-frequency motor-generator set, located in the operator's cab, supplies current to two transformers which have their secondary windings connected to pairs of brushes in contact with the

wheels at the front and rear of the car. This voltage breaks down the high resistance film between the wheels and the rails, thus effecting a reliable shunt. Since the Autotram's wheels are of the resilient type, it was necessary to devise a system of brushes and contact rings to carry the high voltage current to the wheel tires. Indicator lamps in the operator's cab show whether or not the signal system is functioning properly.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended April 1 amounted to 494,588 cars, an increase of 18,738 cars as compared with the week before and only 50,373 cars less than the total for the corresponding week of last year. Grain and grain products showed an increase of 4,943 cars as compared with the corresponding week of last year and increases over the totals for the preceding week were reported as to all commodity classifications except coal, coke and livestock. Miscellaneous loading showed an increase of 13,371 cars. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading

Week Ended Saturday, April 1, 1933

Districts	1933	1932	1931
Eastern	114,934	126,365	166,517
Allegheny	92,778	108,624	148,392
Pocahontas	32,091	32,278	42,051
Southern	80,439	86,299	120,075
Northwestern	57,369	63,374	85,428
Central Western	72,032	82,322	103,005
Southwestern	44,945	45,699	62,384
Total Western Districts	174,346	191,395	250,817
Total All Roads	494,588	544,961	727,852
Commodities			
Grain and Grain Products	34,119	29,176	36,706
Live Stock	14,833	16,203	19,499
Coal	87,650	94,781	118,320
Coke	3,713	4,408	7,678
Forest Products	17,059	19,186	31,083
Ore	2,654	2,183	5,569
Mdse. L.C.L.	159,236	186,489	225,423
Miscellaneous	175,324	192,535	283,574
April 1	494,588	544,961	727,852
March 25	475,850	561,118	738,880
March 18	449,712	584,759	741,253
March 11	437,813	575,481	733,580
March 4	477,827	559,479	723,215
Cumulative total, 13 weeks	6,204,267	7,335,790	9,372,110

The freight car surplus on March 14 was 691,061 cars, an increase of 41,431 cars as compared with the number on February 28. The total included 372,750 box cars, 241,785 coal cars, 33,970 stock cars, and 14,354 refrigerator cars.

Car Loading in Canada

Car loadings in Canada for the week ended April 1 totaled 34,584 cars, which was a decrease from the previous week's total of 948 cars, due almost entirely to a reduction in the western division of 1,464 cars of grain, although grain loading in the west, was heavier than in 1932 by 933 cars.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada:		
April 1, 1933	34,584	18,016
March 25, 1933	35,532	16,418
March 18, 1933	35,886	16,581
April 2, 1932	41,391	23,152
Cumulative Totals for Canada:		
April 1, 1933	430,799	222,253
April 2, 1932	535,333	282,024
March 28, 1931	607,836	362,280

Rate Hearings Begin April 24

THE Interstate Commerce Commission has assigned its freight rate investigation, No. 26,000, for hearing on April 24, in Washington, D. C. Division 8 of the commission, composed of Commissioners Aitchison, Porter and Lee, has been created to conduct the hearings. Other members will sit with Division 8 as much as their other work permits. Members of the commission who are unable to sit in the hearing will be kept currently informed of the evidence presented and the commission as a whole will hear argument shortly after the close of the hearings, at which time questions of law as applied to facts of record may be discussed.

Division 8 will be assisted by W. V. Hardie, director of traffic; M. O. Lorenz, director of statistics; Charles S. Morgan, economist; and F. H. Barclay, C. W. Berry, and M. T. Corcoran, examiners.

The scope of this proceeding is defined by the commission's order of March 31, instituting the investigation. Relations between particular commodities or between particular points under existing rates are not in issue. The lawfulness of particular individual rates will not be considered and the commission in a notice to the public says that rate evidence presented should be clearly typical of the general level of rates, in the respective territorial rate groups, on the commodities to which it relates. The following list enumerates matters which it is suggested should be covered by the evidence to be presented. This list is not all inclusive; it is intended merely as an indication of matters about which the commission wishes to have the facts developed:

(1) Are the present freight rates and charges of respondents reasonable in the aggregate in the country as a whole or in the several territorial rate groups? Are the present general levels of freight rates and charges on commodities or descriptions of traffic moving in substantial volumes in the country as a whole or in one or more of the designated rate groups reasonable?

(2) To what extent are respondents realizing adequate earnings and assuming the continuance of substantially the present level of rates, what are the prospects for the future? The answers should be given separately for the various rate groups and should cover a representative period of years. The extent to which the individual Class I railways have earned their fixed charges should be shown for selected representative years.

(3) Show the volumes of freight and passenger traffic by rate groups in each of the years 1921-1922, including cars loaded, tons of freight originated, ton-miles and passenger miles and ton-miles and passenger-miles per mile of line. Data for 1933 should be given for as many months as statistics are available in comparison with similar periods in the prior years specified.

(4) To what extent have respondents' operating expenses been reduced (or increased, as the case may be) since January 1, 1929? Explanations of the changes should include the effect of (a) furlough or discharge of employees; (b) reductions in salaries and wages or changes in the conditions under which employees work; (c) reductions or economies in service; (d) curtailment of maintenance; (e) changes in costs of fuel, rails, and other principal materials used by railways; (f) more efficient operation resulting from improved methods or from the substitution of improved machinery and equipment; (g) other changes in conditions affecting the cost of operation.

(5) To what extent have respondents' taxes and fixed charges been reduced (or increased, as the case may be) since January 1, 1929?

(6) What is the present condition of road and equipment? What expenditure, if any, will be required to restore the road and equipment to a satisfactory condition (a) to handle the present volume of traffic, and (b) to handle a volume of traffic equal to the average of the period 1927-1931? This information should be furnished by rate groups and may also be furnished by individual roads.

(7) To what extent can net income be increased by greater economy and efficiency in management, such as less circuitous hauling and further pooling of freight and passenger services?

(8) What changes in rates, increases or reductions, of importance have been made since January 1, 1929? Only changes

(Continued on page 561)

Improved Car Accounting and Statistics at Lower Costs

Boston & Maine applies punch card equipment to advantage in car accounting and the preparation of operating statistics

By George F. Glacy
Comptroller, Boston & Maine

THE emphasis which is being directed to the improvement of freight and passenger service on all railroads of the country has become the outstanding feature of the business. It is impossible to assign any beginning date to the movement toward better facilities, more effective supervision, and more efficient methods of train operations, etc. In 1925 an extensive program toward improved facilities was undertaken on the Boston & Maine and much time and study were given to developing more effective supervision and to the application of more efficient train operation.

The accounting department, co-operating in the study, soon discovered a lack of knowledge on the part of our operating officers as to the cost of passenger and freight operations, gross ton-miles, gross tons per train, gross tons per locomotive, gross tons per train-hour, gross tons per locomotive-hour, train-miles per train-hour, pounds of coal per thousand gross ton-miles, wage costs, fuel costs and locomotive repair costs—these last three items constituting over 90 per cent of what are called out-of-pocket expenses, which mean the direct expenses that vary with the volume of traffic. This lack of information on the part of our operating officers was due entirely to the fact that, even though such information was readily attainable, the proper statistics had never been furnished them in such form and at such time as to make them of any value. Yet the necessary data were available from conductors' wheel reports, yard clerks' interchange reports and train rosters. All of these reports had for years been coming into the car accountant's office.

The business of railroads is to transport persons and property from one point to another by the operation of trains. The relative efficiency of our management could up to this time be measured only by the comparison of the results of its operations for different periods and also by the comparison of these results with the operations of other railroads, mostly by the use of the "operating statistics," so-called, which had their birth during federal control. These statistics had their value but it was mostly of a historical nature, and it was clearly recognized that any railroad management would be unwise if it depended entirely upon them to reach conclusions and form judgments as to whether it was going ahead, standing still, or slipping back in the matter of economy or efficiency.

Operating Officers Not Doing Enough "Figuring"

To the accounting department was assigned the task of correlating such information as was shown on records being received in the car accountant's office and from records already available in the accounting department so that statistics of a somewhat different character could be supplied our operating officers daily and weekly, giving them a clear and complete picture of their endeavors, the purpose being to enable them to correct bad practices or costly operations as soon as they developed. It is hardly necessary to say that concentration of this kind will save money and promote efficient operation. The transportation officers, especially division superintendents, were not doing enough "figuring"; the pad and pencil had fallen into disuse, not because of any fault of theirs, but due to their not being supplied with divisional statistics that were up-to-the-minute.

The first part of the task of supplying daily operating and cost statistics, thus providing a means of intelligent and timely supervision, was the establishing of a bureau of statistics as part of the accounting department organization and the transferring of the car accountant's office, which since its inception had been under the jurisdiction of the operating department, to the accounting department's jurisdiction.

Wheel Reports Used for Basic Data

The Boston & Maine in common with many other railroads was using a wheel report with a half sheet flap, the flap being used for cut-up slips in the car accountant's office for the purpose of recording car movements and preparing per diem reports, the full sized wheel reports going to the bureau of statistics for use in the preparation of the daily and weekly operating statistics.

It was recognized that the clerical and calculating machine effort in preparing car records, per diem reports and statistics was a more costly operation than was warranted. This may have been partly because of the fact that here was one report (wheel report) being used for two different purposes and entailing clerical effort which seemed in a sense duplication of work. Investigation of methods followed by other railroads in their car accountants' offices and in preparation of statistics disclosed that these same conditions existed on practically every railroad examined, little or no progress or improvement having been made in the car accountant's work and preparation of operating statistics by the use of mechanical accounting machines.

Fifteen months' study of this problem has enabled the Boston & Maine to revolutionize completely the methods followed since 1925 in preparing operating statistics and doing the car accountant's work. In October, 1932, we installed Powers accounting machines consisting of: 2 Automatic key punches—dual magazine; 6 Automatic key punches; 1 Summary card punch; 1 Interpreter; 2 Sorters—non-counting; 1 Sorter—counting; 1 7-Unit printing tabulator, 10 sector; 1 7-Unit printing tabulator, 10 sector direct subtraction; 1 5-Unit printing tabulator, 10 sector.

This installation has enabled us to make a payroll

saving of $10,000 a year after paying machine rental and purchasing punch cards, while at the same time giving us a system of accounting embodying many improvements over our old plan and making available statistical material of indeterminate value.

The major advantage of this machine method of car accounting and preparation of statistical data over the manual method formerly used is worthy of consideration here before detailing the method followed in working out the mechanical operation of the plan as used by us. These advantages are as follows:

Advantages of New Method

1. Conductors and interchange clerks are permitted to use ditto marks in preparing wheel and interchange reports. This reduces their clerical work 40 per cent and leads to greater accuracy.

2. The elimination of the half sheet flap for cut-up slips materially speeds up the work. There are no slips to become mutilated or lost.

3. A more accurate and neater car record can be produced. Less errors are made in punching cards than in entering the car records from cut-up slips. A key-punch operator uses the touch system in punching, enabling her to concentrate on the information to be punched into the cards, operating at a much greater speed than could be maintained under the manual method of posting from cut-up slips. By using cut-up slips it was necessary for the clerk, first, to find the page in the car record book, hunt for a previous entry of the movement of the car, find the proper date on which entry was to be made and then make the entry. While doing this it was very possible to enter records opposite the wrong car or under the wrong date or fail to enter because the slip was passed up or was missing or was mutilated in cutting. The printed record, as produced by the printing tabulator from punch cards, is compact and easily and faster read, the number of car record books being reduced to one-third the number of car record books necessary under the manual plan. This saves paper, cost of printing, binders and filing space.

4. The necessity of a manual car count, which is expensive and at best limited and inaccurate, is entirely eliminated. Punched interchanged cards covering receipts are sorted by machines at the rate of 425 cards per minute and are automatically counted. This count may be divided as between system and foreign cars, by ownership and by classes of equipment. Count is made daily and furnishes accumulated records.

5. Work in connection with looking up home routes is materially reduced. Each day a tabulation of foreign cars received is made, cars being listed in strict numerical order. This produces a neat record and eliminates the necessity of referring to the various car record books as under the old system, to look up disposition records. This eliminates the necessity of disturbing the car record clerks. The home route tabulations are on the disposition clerk's desk, readily available for use. They are used daily during the current month, after which the reduced number of car record books are used, these being faster, easier to read and require a less number of books to handle.

6. Under the punch card system the work of compiling records is performed daily and not allowed to accumulate as is necessary under the manual record when peak loads must be handled in a minimum amount of time. Under the punch card system it is necessary to pull cards for foreign cars received to match entries on interchange reports for foreign cars delivered. In this daily operation if a file clerk fails to find a card covering the receipt record of the car in the foreign interchange card file it indicates immediately a short receipt—no cards punched or omitted from the interchange report of cars received—or is a result of an error in interchange report of cars received or forwarded or an error in punching received record card. The card file of car records furnishes the answer and must be referred to in order to complete the record. In other words, if car is reported under wrong owner's mark this will be easy to adjust since cards are filed in strict numerical order.

7. The necessity of transferring records from one month's books to the following month's for per diem accounting purposes was a slow, expensive operation and full of inaccuracies. Under the punch card system this is entirely eliminated; the transfer is mechanically performed through the use of a reproducing punch which reproduces with positive accuracy the foreign cars on hand and assures accurate records for figuring current month's per diem. The figuring of foreign per diem under the manual method was a slow, laborious task subject to many errors and requiring for accuracy a recheck of each per diem clerk's work. Under the punch card plan a multiple extension operation, absolutely accurate, does not require any rechecking and operates much faster and less expensively than the manual plan.

8. The preparation of per diem reports under the manual plan was expensive and slow, requiring on this road fourteen days of clerical time each month. Cars were not listed in numerical order and cars which earned no per diem were not reported. Under the punch card plan per diem reports are produced with speed and accuracy, listing the cars in proper numerical order. It also permits listing of cars received and delivered on the same date on which no per diem was earned. Twenty hours each month are required for this operation.

9. The figuring of mileage of private line cars under the manual plan required that mileage be figured and entered in private line car record books for each car, permitting opportunities for errors both in figuring and noting the mileage in the car record books, and later in transcribing the mileage statements from record books. Under the punch card plan the mileage is punched into the cards from conductors' wheel reports. The cards which are used to prepare the private line car record books are sorted by classes of equipment, car number order for each class, for each owner, and the mileage statement prepared on the tabulators. This permits making an accurate report showing the cars by classes in number order.

10. Under the manual plan the compilation of car, train and locomotive statistics is performed as a separate operation entailing considerable calculating machine expense. The number of loaded and empty cars must be counted and recorded. The loaded and empty car miles, net and gross ton-miles must be accumulated by multiplying and accumulating the number of cars, net and gross tons for each distance and recording the results.

Statistics a By-Product of Car Accounting

Under the punch card plan statistics are furnished as a by-product of car records and are available for distribution the day following the receipt of the basic data in the car accountant's office making available for statistical purposes the following information:

1. Daily statement by trains of the number of loaded and empty cars hauled, loaded and empty car-miles, net and gross ton-miles, train-hours. Such information can

be secured by individual trains, by direction, by operating divisions, by main and branch lines.

2. Data are available for studies of traffic density.

The card plan as applied to locomotive statistics makes daily available data which indicate how the power is being used, subdivided by divisions, main line and branch line, by service and as between principal, helper and light. These same cards are used to compile individual locomotive mileage.

How the Plan Works

Three reports provide basic details for car accounting office records and the preparation of operating statistics under the punch card plan: first, freight conductors' wheel reports; second, interchange reports issued at junction points; third, passenger conductors' wheel reports.

Freight conductors' wheel reports are mailed direct to the car accountant's office. These reports when received are edited for accuracy of information, checked off against schedules of regularly operated trains, each regularly scheduled train having been assigned an office train symbol number, which number is entered on wheel report; the extra trains operated are assigned a number within the group of numbers allotted for similar train movements. At the time the wheel report is being edited a slip is prepared covering locomotive information. Wheel reports and locomotive slips are passed to key punch operators and the following information is punched on cards:

Freight car card (*Exhibit A*)—Car initial and number, kind, loaded or empty, train symbol number, date, time and station taken, station left, date and time, miles, net and gross tons.

Locomotive card (*Exhibit B*)—Ownership, number, date, class of service, principal or helper miles, train switching miles, terminal miles, station to station movement, and weight.

When the above data have been punched on cards, the cards are passed through a mechanical interpreter which prints at the top of each card the figure represented by the holes punched in each column of the card, (this interpretation has proved of indispensable value as it greatly facilitates card reading and the performance of work).

Freight car cards and corresponding wheel reports then pass to the tabulator equipped with a summary card punch where the first operation is to accumulate the loaded and empty car miles, net and gross tons and the number of loaded and empty cars taken at each station, and when station changes the totals for previous stations are punched automatically into a statistical card (Exhibit C). Freight car cards are next tabulated for station left, cards having been fanned to bring together all cars dropped at each station. Summary cards are punched for net and gross tons and number of loaded and empty cars dropped at each point. Summary cards covering stations taken and left are fanned together beginning with the card for pickup at starting point of train and continuing through each station to final drop card at end of run. These cards are then run through

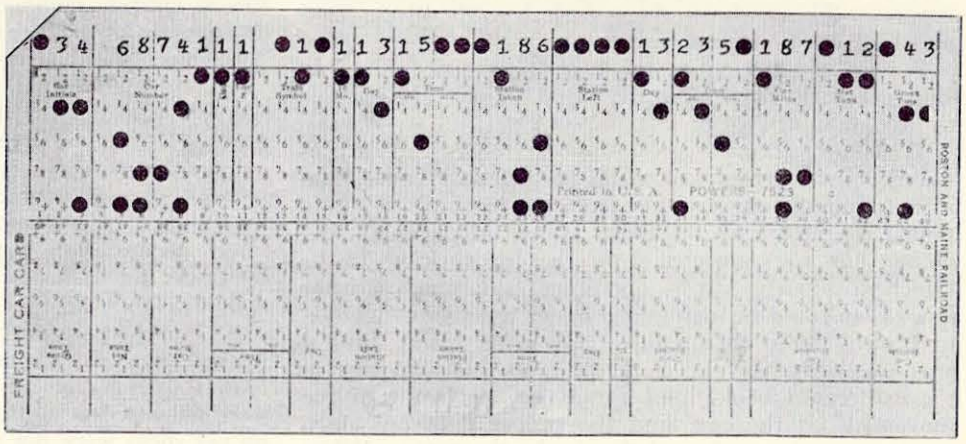


Exhibit A

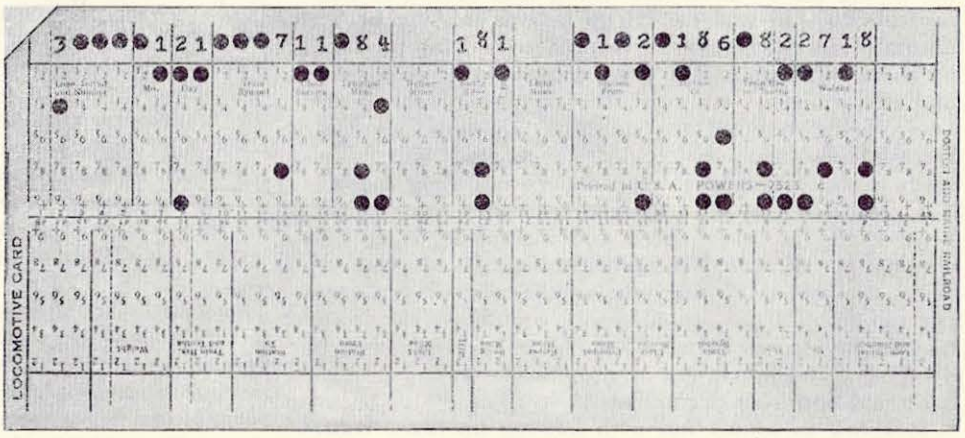


Exhibit B

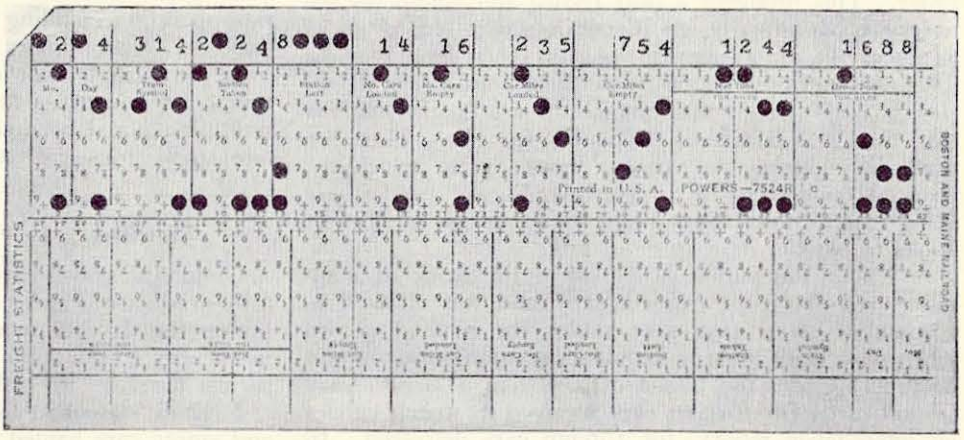


Exhibit C

a tabulator equipped with direct substraction and progressive total devices and a tape is printed showing date, train symbol number, station, net and gross tons, number of loaded and empty cars handled by train between stations and total loaded and empty car miles for train.

Net and gross tons are multiplied by miles between stations shown by use of calculating machine and accumulated to obtain the total net and gross ton miles for each train. A master card is then punched for train totals and after master cards for the day have been punched they are sorted by train symbol number to separate them by operating divisions and directions, the unit figure in train symbol number indicating direction and the hundreds figure indicating operating division.

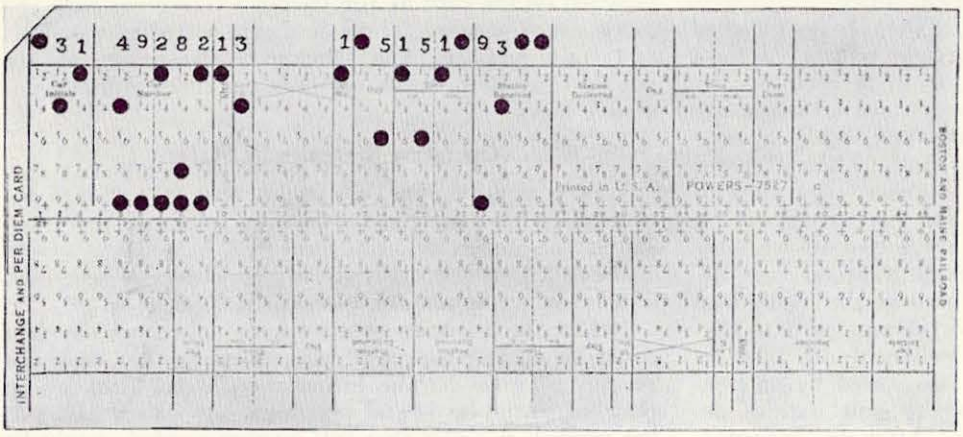


Exhibit D

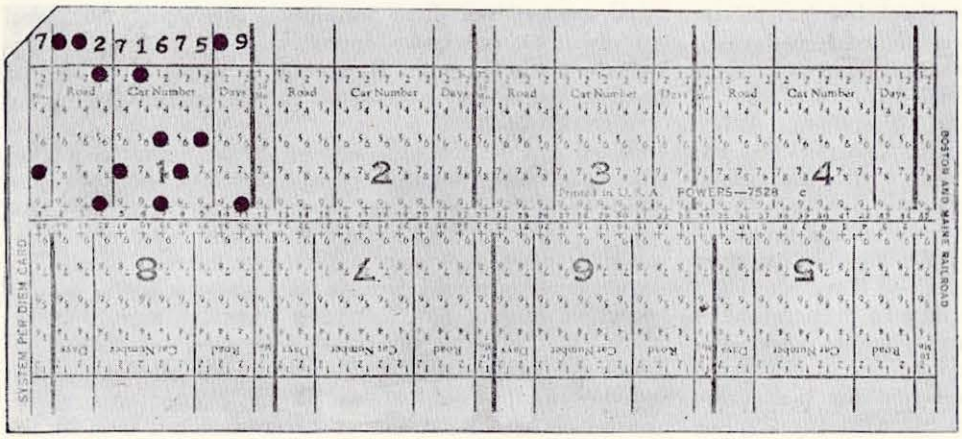


Exhibit E

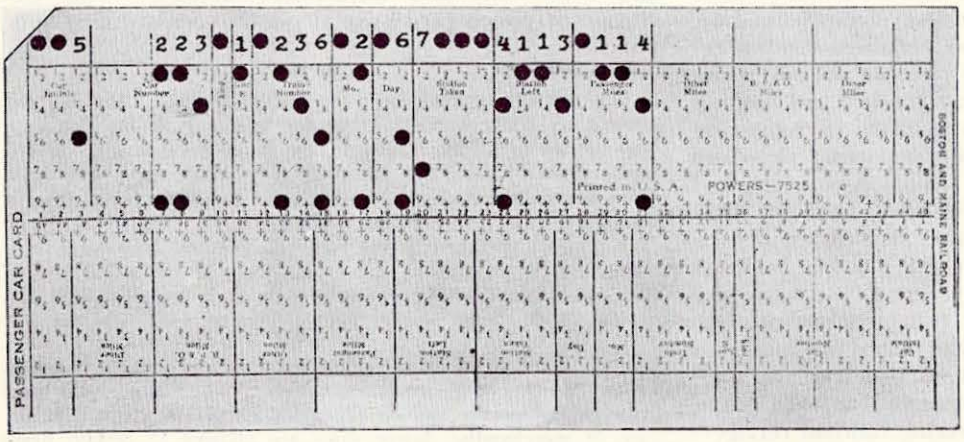


Exhibit F

A list on the tabulator is prepared to cover the day's operations showing operating divisions and direction with trains in numerical order and a total for each listing.

Locomotive cards, after being checked against train dispatcher's roster, are sorted in the same order as are train cards and are checked against train cards to eliminate the possibilities of omissions. Light locomotive movements and miles are punched from the dispatcher's roster. The list is then printed on the tabulator in train order with principal and helper locomotives and miles made by each train. These two lists run in numerical order and afford an opportunity quickly to locate the power used on each train. Locomotive cards are then sorted by weights and tabulated list is prepared to show the total miles in each class of service and is used to compute locomotive ton-mile statistics.

From the master cards punched to cover daily operations weekly and monthly statistical information is readily obtainable.

Interchange reports pass to key punch operators immediately upon receipt in the office and card (Exhibit D) is punched for each card appearing thereon, showing the car initial and number, kind, loaded or empty, date, time and station received at or delivered. Two cards are punched through the use of dual magazine key punches for each foreign car received and a single card is punched for private and home cars received. Two cards are punched for home cars delivered off line and one card is punched for foreign and private cars delivered. Interchange count of cars received and delivered is made from these cards by using sorting machine equipped with card counters for each pocket. The duplicate cards punched are used for per diem purposes. After interchange count a daily list in numerical order is prepared on tabulator of all cars received which is used for a quick home route record, and on cars delivered a tabulated list is made of foreign railroad cars and used in pulling per diem cards for use in preparing per diem reports.

Car records. Freight car cards, after release from statistical work, and the interchange cards for both received and delivered cars are sorted together daily by car number and ownership and filed in card cabinets, properly indexed, for current reference. The interpretation previously mentioned permits quick read-

ing of these cards so that no delay is being experienced in furnishing record information. At the close of the month cards are taken from cabinets and sorted by dates and numbers for permanent printing of car record. This permanent record shows all of the information on the interchange card (Exhibit D) and the first 36 columns on freight car card (Exhibit A). By having all of this information printed in the permanent record it will be readily seen that this record carries all of the information usually asked for when time records of car movements are requested, thereby eliminating the necessity for reference to interchange and wheel reports for such information. It is also possible to reduce the number of record books necessary, inasmuch as there is no waste space, the record of one car being followed immediately by that of the next car in numerical order.

Per Diem. Transfer card (Exhibit D) is punched automatically to cover each foreign railroad freight car on line at the close of the month to establish per diem for following month. These transfer cards are reproduced from received interchange cards already punched and verified as being on hand. These transfer cards are sorted into file by car number, regardless of ownership. Interchange cards for cars received the first day of the current month are sorted in with the transfer cards. The list of foreign railroad cars delivered previously mentioned, is used as the medium to pull from this file the transfer or receipt card to correspond with the car reported delivered off line the first day. Cards pulled for day are sorted by date received and run through key punch to gang date of delivery and number of days on line. After this operation, cards are sorted by ownership and filed. This same procedure is continued daily and completed cards filed by roads. Each day cars open on check list (no receipt card having been located in file) are immediately investigated and error slips are sent to junction points for interchange corrections. By this method errors are handled currently and are not permitted to accumulate. When correction reports are received, cards are punched for correct car initial and number and cards for wrong cars are pulled from the file. In reporting per diem to car owners, cards are sorted in numerical order and tabulated on prescribed per diem form. These forms are made up in rolls with printed original, carbon and blank sheet for copy, thereby saving considerable time in preparation of report. The tabulator accumulates column, sheet and grand total for each per diem account.

Duplicate interchange cards punched for home cars delivered off line are pulled from list used for a quick home route record and are filed when receipt date and number of days off line are punched. At close of month cards are sorted in numerical order and tabulated to show total per diem earned on each car away from home line. Per diem earnings as reported on per diem reports received from foreign railroads are punched on card (Exhibit E) showing month, road, car number and number days per diem earned. Cards are sorted in numerical order and tabulated to show roads reporting per diem earned and total for each car. This list is checked against the list previously made showing total per diem due and any discrepancies noted are checked against the printed record of junction movements off line punched from junction slips received daily.

Private Mileage. Freight car cards for private line accounts after listing for permanent record are tabulated to show line number, car number, kind of car and total loaded and empty miles earned on each car with grand total for each account. Cards covering railroad refrigerators on a mileage basis are handled in a similar manner.

Passenger Car Cards. Wheel reports issued by passenger conductors pass to key punch operators and cards (Exhibit F) are punched showing car initial and number, kind, loaded or empty, train number, station to station move and miles according to class. When wheel reports for the day are completely punched, cards are sorted by divisions and train numbers and the list is run on tabulator to show operations by divisions. Cards are then released for passenger car records and are sorted by ownership and filed. At the close of the month, a permanent record is run and foreign passenger car cards are tabulated for mileage earnings to report to car owners.

The same locomotive card (Exhibit B) is used for passenger locomotives and complete information is punched on the card as for freight locomotives with the exception of weight. These cards are sorted by divisions and train numbers, and tabulated. Master cards are punched for daily totals for both car mileage and locomotive miles.

Operating Statistics by States

Where requirements of public service commissions necessitate the filing of operating statistics by such states, this information is procured in a very simple manner. Statistical cards already punched and described previously are sorted and used for this purpose.

Before the adoption of the above punch card system could be made effective it was necessary that codes be set up to give certain information which had to be punched in the cards and rearrange our station and siding symbols in order that full number symbols might be in use.

This plan makes for savings and amplification in the settlement of per diem accounts. The punch card plan of operation eliminates entirely the use of cut-up slips which at the present are being forwarded to the car owners where they are sorted and entered in the system car record books.

The road delivering a foreign car at a junction other than the home junction punches at one operation two cards from the interchange report of cars delivered. One set of cards could be sorted in car number order, tabulated in detail and sent with the tabulation to the car owners. This would provide the owners with the proper junction record, and a record identical with that retained by the delivering road. The card would then become the car record for the car owner and at the end of the month would appear in the printed car record. Inasmuch as the car owner's record would then be the same as the delivering road's record, better per diem accounting would result. There would be less tracers and corrections and adjustment notices. This exchange of punch cards would permit economy and simplification.

Although the Italian State Railways estimate that the amount of traffic carried by motor trucks is about one-tenth that carried by all the railroads, the latter have so far confined their efforts to meet this competition to improvements in train service and reductions in rates, according to recent reports received by the United States Department of Commerce. Some of the measures taken by the State Railways in this regard are increasing the number of fast trains, motor trains on secondary lines, pick-up and delivery services, a fast "express package" system, and tie-ups with motor carriers for localities not served by trains. Among the tariff measures taken to meet the new competition are reductions granted to tourists, issuance of special tickets for circulation within specified areas, reductions in week-end tickets and on those for excursion trains. In the case of merchandise, lower rates are allowed to certain firms which agree to ship a fixed number of full carloads.

Railway Inventories Reduced by Almost $450,000,000

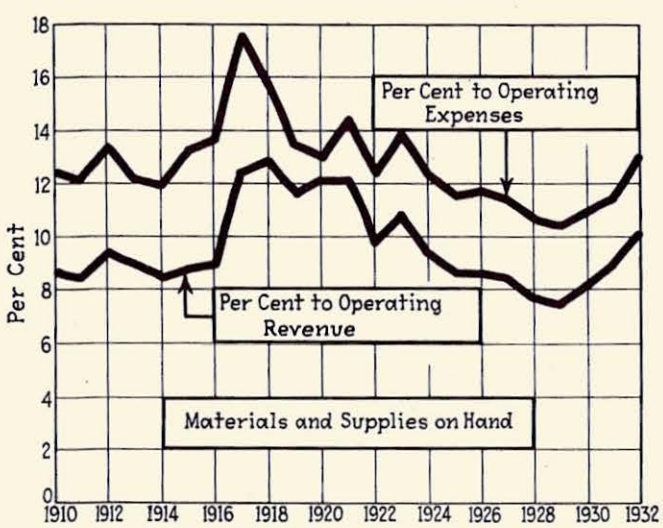
Fifty-eight per cent reduction of capital in materials sets new record for management and clears path for purchases

WITH the co-operation of the railroads, the *Railway Age* has again succeeded in compiling unusually complete figures on the volume of material and supplies carried in stock and consumed by the railroads. Based on these data, which comprise reports of the conditions on more than 150 railroads, including practically every class I railroad, it is estimated that the railroads of the United States had a $320,000,000 inventory of unapplied stock on January 1, 1933, while subsequent reports indicate a further reduction of approximately $10,000,000 in this total since January. The inventory on January 1 was $59,492,000 less than the amount of capital tied up in unapplied materials the year previous and $477,217,000, or over 58 per cent, less than the working capital so impounded at the end of 1920. At that time inventories amounted to $766,267,000.

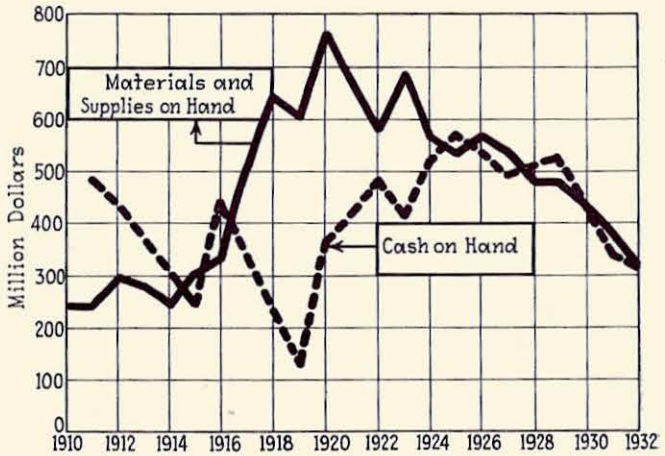
The reduction of almost $450,000,000 which has oc-

Table I—Materials and Supplies on Hand, All Railroads in U. S.

	On Hand	Reduction	Per Cent of Op. Rev.	Per Cent of Op. Exp.
June 30, 1911.....	$244,932,000	.....	8.6	12.4
June 30, 1912.....	246,790,000	+$1,858,000	8.5	12.1
June 30, 1913.....	300,601,000	+53,811,000	9.4	13.4
June 30, 1914.....	278,940,000	23,661,000	8.9	12.2
June 30, 1915.....	248,888,000	30,052,000	8.4	11.9
June 30, 1916.....	303,827,000	+54,939,000	8.8	13.3
Dec. 31, 1916.....	333,361,000	+29,534,000	9.0	13.7
Dec. 31, 1917.....	514,051,000	+180,690,000	12.5	17.6
Dec. 31, 1918.....	641,759,000	+127,708,000	12.9	15.8
Dec. 31, 1919.....	608,527,000	33,232,000	11.6	13.5
Dec. 31, 1920.....	767,267,000	+158,740,000	12.1	12.9
Dec. 31, 1921.....	676,125,000	91,132,000	12.0	14.4
Dec. 31, 1922.....	556,260,000	119,865,000	9.7	12.3
Dec. 31, 1923.....	693,078,000	+136,818,000	10.8	13.9
Dec. 31, 1924. ...	569,690,000	123,388,000	9.4	12.3
Dec. 31, 1925.....	535,126,000	34,564,000	8.6	11.5
Dec. 31, 1926.....	561,007,000	+25,881,000	8.6	11.8
Dec. 31, 1927.....	532,063,000	28,944,000	8.5	11.4
Dec. 31, 1928.....	478,625,000	53,438,000	7.7	10.6
Dec. 31, 1929.....	477,051,000	1,574,000	7.5	10.4
Dec. 31, 1930.....	437,375,000	39,676,000	8.2	11.0
Dec. 31, 1931.....	379,992,000	57,373,000	8.9	11.5
Dec. 31, 1932.....	320,050,000	59,942,000	10.2	13.1



Relation of Annual Inventories to Annual Railway Operating Revenues and Expenses



Comparison of Total Book Value of Materials and Supplies with Cash on Hand as Reported in Corporation Balance Sheet Accounts

Table II—Materials and Supplies on Hand—Class I Railroads, January 1, 1933*

Frogs, switches, crossings and parts	$8,250,000
Track bolts, spikes, etc.	9,150,000
Track tools and supplies	1,970,000
Interlocking, signal, telegraph and telephone material	7,250,000
Cement, cast pipe, roofing, etc.	1,830,000
Bridge and building lumber	7,250,000
Switch ties	6,900,000
Cross ties	67,500,000
Iron bridges and structural steel	5,650,000
Rail, new and second-hand	48,300,000
Water and fuel handling and work equipment material	3,150,000
Chemicals for timber	1,270,000
Total M. of W. and S.	$168,470,000
Bolts, nuts, washers, etc.	$4,550,000
Springs, car and locomotive	2,400,000
Boiler tubes, dry pipes, etc.	4,600,000
Tubing and soft metals	650,000
Bar and sheet steel	5,100,000
Forgings, locomotive and car	10,400,000
Castings, locomotive and car	19,300,000
Brass castings and bearings	3,120,000
Air-brake material, ex. hose	4,370,000
Locomotive appliances	5,150,000
Passenger-car trimmings	2,050,000
Electrical materials	5,600,000
Shop fuel	675,000
Foundry supplies	315,000
Wheels, tires, axles	18,300,000
Lumber for cars and locomotives	6,250,000
Machinery, boilers, trucks and other materials	3,050,000
Total M. of E.	$95,880,000
Train and station supplies, grain doors, etc.	$5,800,000
Lubricating and illuminating oils, packing, etc.	2,850,000
Fuel for locomotives, stations and cars	20,200,000
Commissary supplies	2,100,000
Total Transportation	$30,950,000
Piping and fittings	$2,650,000
Hand tools and hardware	2,920,000
Rubber and leather	1,750,000
Glass, chemicals, paint supplies, etc.	2,480,000
Stationery and printing	2,050,000
Scrap	12,900,000
Common to All Departments	$24,750,000
Grand Total	$320,050,000

* Estimated by the *Railway Age* on the basis of reports from representative roads.

Table III—Materials and Supplies Used

Road	Locomotive Fuel			Cross Ties			Rail—New and Relay		
	Used, 1932	On Hand Dec. 31	Days' Stock	Used, 1932	On Hand Dec. 31	Months' Stock	Used, 1932	On Hand Dec. 31	Months' Stock
Akron, Canton & Youngstown	$56,824	$966	6.3	$41,935	$4,534	1.3	$1,819	$5,103	33.8
Alton	882,773	20,482	8.5	339,228	95,841	3.4	52,877	113,245	25.8
Ann Arbor	321,674	7,658	8.6	134,491	96,995	8.7	12,854	29,040	27.0
A. T. & S. F. Lines	10,110,641*	2,609,338*	93.5	1,929,601	5,964,667	37.2	1,412,806	3,058,515	26.0
Atlanta & West Point Lines [1]	174,527	7,858	2.0	44,060	305,329	83.0	22,691	76,820	4.0
Atlanta, Birmingham & Coast	.....	.....	...	.....	.....	...	.....	.....	...
Atlantic Coast Line	2,737,983	554,037	74.0	1,152,690	564,336	5.8	929,474	2,199,035	28.4
Char. & West. Carol.	114,459	7,352	23.3	85,984	56,789	7.9	41,408	126,919	36.5
Baltimore & Ohio	5,118,308	232,160	16.5	1,836,801	2,941,476	19.4	1,807,128	2,902,455	19.3
Bangor & Aroostook	379,890	133,201	128.0	134,622	144,011	12.8	184,830	70,699	4.6
Belt Railway of Chicago	.....	.....	...	.....	.....	...	.....	.....	...
Bessemer & Lake Erie	.....	.....	...	.....	.....	...	.....	.....	...
Boston & Albany	1,799,510	78,745	16.2	335,647	181,203	6.5	224,009	149,991	8.0
Boston & Maine	3,267,051	144,385	16.2	364,506	2,164,560	71.5	454,369	479,826	12.6
Burlington-Rock Island	32,490	4,024	45.5	5,624	78,592	169.0	389	534,164	...
Central of Georgia	809,393	38,713	17.4	213,123	150,331	8.5	77,843	175,016	27.0
Central of New Jersey	1,907,209	31,845	6.1	211,233	296,164	16.8	200,608	276,797	16.5
Central Vermont	513,788	11,344	8.1	193,089	90,298	5.6	55,816	125,224	26.8
Chesapeake & Ohio	3,222,184	296,514	33.8	590,650	511,287	10.3	2,030,623	1,045,450	6.2
Chicago & Eastern Illinois	825,321	25,989	11.4	233,169	76,431	3.9	112,956	59,585	6.5
Chicago & Illinois Midland	110,389	1,794	5.9	18,257	2,842	1.8	1,580	4,018	31.5
Chicago & North Western	4,800,500**	398,317**	30.4	1,717,287	2,190,405	15.3	356,541	1,084,392	36.8
Chicago, Burlington & Quincy	4,372,275*	285,813*	24.0	1,767,926	2,429,059	16.7	587,264	1,314,232	27.0
Chicago Great Western	1,401,642	30,300	7.9	545,036	20,179	0.5	140,580	64,978	5.5
Chi., Ind. & Louis	.....	.....	...	.....	.....	...	.....	.....	...
Chi., Mil., St. P. & P.	5,533,416*	329,261*	21.6	2,653,080*	2,890,479*	13.1	1,422,872	623,391	5.3
Chicago, R. I. & P. Lines	4,779,759	286,969	22.0	502,669	1,527,151	36.5	179,682	289,571	19.3
Chicago, St. P., Minn. & O.	1,398,779	83,487	21.8	543,699	157,905	3.5	322,463	161,862	6.0
Clinchfield	127,159	3,040	8.7	153,436	135,242	10.6	40,116	108,232	32.4
Colorado & Southern	392,573	39,877	37.0	121,337	113,587	11.2	163,142	135,099	10.0
Columbus & Greenville	54,212	716	4.8	47,018	1,440	0.3	1,366	1,766	15.5
Delaware & Hudson	1,635,360	598,129	133.0	538,525	532,405	12.0	545,884	280,679	6.3
Del., Lack. & Western	3,863,172	146,694	13.8	368,928	234,995	7.8	580,308	177,175	3.7
Denver & Rio Grande Western	953,455	31,924	12.2	601,796	385,374	7.7	53,225	622,270	140.0
Denver & Salt Lake	.....	.....	...	.....	.....	...	.....	.....	...
Detroit & Mackinac	52,250	5,740	40.0	28,827	22,596	9.6	2,953	15,697	64.0
Detroit & Toledo Shore Line	77,236	2,281	10.8	21,343	44,808	25.2	3,906	20,477	62.0
Detroit, Toledo & Ironton	180,699	2,335	4.7	94,028	79,055	10.2	5,472	73,338	161.0
Duluth, Missabe & Northern	352,286	197,602	175.0	17,361	388,914	27.0	7,336	142,070	232.0
Duluth, S. Shore & Atlantic	207,170	125,307	220.0	56,788	15,591	3.3	4,992	30,648	82.0
Duluth, Winn. & Pacific	.....	.....	...	.....	.....	...	.....	.....	...
Elgin, Joliet & Eastern	412,228	28,745	25.4	131,219	77,652	7.1	27,154	112,485	49.0
Erie System [2]	4,025,577	127,315	11.6	1,331,075	537,811	4.8	2,045,199	382,982	2.2
Florida East Coast	339,553	85,944	92.0	74,406	14,081	2.2	23,039	196,559	102.0
Fort Smith & Western	.....	.....	...	.....	.....	...	.....	.....	...
Fort Worth & Denver City	247,545	24,261	35.6	88,752	75,201	10.1	154,560	30,999	2.4
Georgia	338,784	11,600	12.5	111,201	55,098	6.0	48,399	36,214	9.0
Georgia & Florida	87,258	1,559	6.5	46,427	6,450	1.6	3,279	4,577	16.8
Grand Trunk Western	1,014,574	54,892	19.5	346,018	70,256	2.4	79,968	530,932	80.0
Great Northern	4,446,298	808,009	66.5	1,499,180	842,982	6.8	964,728	752,151	9.3
Green Bay & Western	107,826	6,139	20.8	87,556	58,583	8.0	12,843	69,604	65.0
Gulf, Mobile & Northern	163,851	2,459	5.5	74,765	11,489	1.3	9,133	64,382	84.5
Illinois Central System	5,095,966	198,224	14.2	875,128	1,365,897	18.7	449,165	1,198,014	31.8
Kansas City Southern	.....	335,705	...	.....	307,409	...	.....	71,778	...
Lake Superior & Ishpeming	33,908	27,769	300.0	24,539	21,361	10.4	193	27,415	...
Lehigh & Hudson River	116,769	3,536	11.1	10,652	4,744	5.3	32,498	7,600	2.8
Lehigh & New England	.....	.....	...	.....	.....	...	.....	.....	...
Lehigh Valley	2,780,215†	87,584†	11.5	257,915	278,459	13.0	425,161	266,386	7.5
Louisiana & Arkansas	114,029	60,746	19.3	146,167	136,434	11.1	14,994	59,997	48.0
Louisiana, Arkansas & Texas	26,372	899	12.4	49,060	18,824	4.6	3,414	4,736	16.6
Louisville & Nashville	2,723,662	138,349	13.8	1,133,991	2,501,741	26.5	896,924	1,466,306	19.6
Maine Central	821,776	39,418	17.5	139,213	171,923	14.7	307,847	246,523	9.6
Midland Valley	.....	.....	...	.....	.....	...	.....	.....	...
Minneapolis & St. Louis	494,606	18,348	13.4	200,837	109,430	6.2	19,368	147,024	91.0
Minn., St. P. & S. S. Marie	1,878,484	169,676	32.6	886,472	445,339	6.0	94,338	634,054	8.0
Mississippi Central	32,519*	4,972*	55.2	16,225*	1,853*	1.3	3,786	16,477	52.5
Missouri & North Arkansas	82,118	1,897	8.4	28,262	1,314	0.5	4,782	.....	...
Missouri-Illinois	.....	.....	...	.....	.....	...	.....	.....	...
Missouri-Kansas-Texas	1,358,551	478,933	128.5	453,993	912,879	24.2	105,216	198,235	22.6
Missouri Pacific	4,300,145	528,579	40.5	1,029,864	828,754	9.7	821,167	539,609	7.9
Gulf Coast Lines [3]	464,009	190,257	149.0	297,009	210,806	8.5	148,272	128,286	108.0
International-Great Northern	.....	.....	...	.....	.....	...	.....	.....	...
Mobile & Ohio	511,368	20,204	14.4	199,049	9,766	0.6	59,122	36,381	7.3
Monongahela	.....	.....	...	.....	.....	...	.....	.....	...
Montour	55,505	706	4.7	13,592	1,230	1.1	2,967	22,063	89.0
Nashville, Chat. & St. Louis	681,357	61,207	32.6	487,402	348,900	8.5	40,031	175,561	52.7
Nevada Northern	48,692	4,103	31.0	20,846*	21,101*	12.1	1,960	9,748	60.0
New Orleans Great Northern	67,243	212	1.1	30,942	29,787	11.5	4,272	7,077	20.0
New York Central [4]	.....	733,729*	...	.....	5,635,891*	...	.....	2,818,730	...
Indiana Harbor Belt	.....	.....	...	.....	.....	...	.....	.....	...
Pittsburgh & Lake Erie	.....	.....	...	.....	.....	...	.....	.....	...
New York, Chicago & St. L.	1,858,564	40,843	8.0	395,904	761,731	23.2	741,553	129,249	2.1
New York, New Haven & H.	3,535,909	474,344	49.0	944,438	724,516	9.2	354,480	524,087	17.5
New York, Ont. & Western	725,626	72,500	36.4	175,520	49,843	3.4	104,361	32,543	3.7
Norfolk & Western	.....	124,597	...	.....	1,037,155*	...	.....	147,891	...
Norfolk Southern	.....	.....	...	.....	.....	...	.....	.....	...
Northern Pacific	3,698,215	306,231	30.0	1,110,036	1,522,244	16.5	158,090	861,723	65.0
Northwestern Pacific	234,485*	40,711*	63.5	37,139	16,541	5.3	11,834	136,933	136.0
Pennsylvania	14,162,645	466,529	12.0	2,303,411	7,478,122	39.0	1,293,606	1,982,924	18.4
Long Island	769,047	32,279	15.4	131,435	23,836	2.2	93,292	37,783	4.8
Pere Marquette	1,804,103	113,344	23.0	635,837	407,795	7.9	4,800	271,038	575.0
Pittsburg & Shawmut	37,427	1,766	17.2	20,220	3,008	1.8	18,429	17,922	11.6
Pittsburg, Shawmut & North	52,273	.....	...	38,215	3,226	10.1	18,239	19,486	12.8
Pittsburgh & West Virginia	46,572	4,000	31.4	25,362	1,551	0.7	11,412	26,632	28.0
Reading System	3,535,399	64,551	6.6	203,486	730,244	43.5	228,178	805,623	42.5
Richmond, Fred. & Potomac	.....	.....	...	.....	.....	...	.....	.....	...
Rutland	399,000	51,030	46.8	142,092	101,236	8.5	60,686	56,965	11.3
St. Louis-San Fran. Lines [5]	2,797,062	136,240	17.8	1,677,839*	365,642*	2.6	292,772*	218,352*	8.9
St. Louis Southwestern Lines	522,879	743,206	520.0	202,161	413,412	24.5	19,358	588,897	372.0
Seaboard Air Line	2,023,480	85,040	15.3	908,274	384,847	5.1	447,070	541,981	14.5
San Diego & Arizona	.....	.....	...	.....	.....	...	.....	.....	...
Southern System [6]	4,632,719	179,434	14.2	3,333,475	947,694	3.4	701,352	799,728	13.6
Southern Pacific-Pacific Lines	10,148,100	1,786,057	57.2	1,364,441	1,085,553	9.5	1,463,728	4,872,643	40.0

* All steam fuel
** All coal
† Includes gas for locomotives.

* All ties

* All rail

[1] Includes W. of Ala. [2] Includes C. & E.; N. J. & N. Y.; N. Y. S. & W. [3] Includes B. S. L. & W.; N. O. T. & M.; St. L. B. & M.; S. A. U. & G

and Carried by Class I Railroads in 1932

Miscellaneous—Less Scrap

Used, 1932	On Hand Dec. 31	Months' Stock	Total Used, 1932	% Off 1931	Months' Stock On Hand	Scrap on Hand Dec. 31	Total on Hand Dec. 31	Decrease from Prev. Yr.	Per Cent Red.	Stock % of Op. Exp.	
$102,133	$75,304	8.8	$202,711	15.0	5.1	$1,925	$88,170	$7,911	8.5	8.2	A. C. & Y.
1,055,321	419,711	4.7	2,228,201	38.2	3.4	23,533	672,814	206,694	23.6	6.4	Alton
376,139	238,031	7.6	845,158	38.5	5.3	4,591	376,389	152,349	28.9	14.1	Ann Arbor
15,597,950	6,932,150	5.3	29,051,000	38.5	7.7	306,834	18,871,506	3,201,523	14.5	18.6	A. T. & S. F.
195,856	358,483	21.8	437,134	30.5	20.5	12,121	760,611	+55,787	+7.8	28.0	A. & W. P.
.....	.....	...	.....	...	...	.....	287,452	120,105	29.5	9.6	A. B. & C.
4,464,697	1,736,665	6.7	9,284,844	28.0	6.6	49,094	5,103,167	899,085	14.9	15.8	A. C. L.
128,683	69,012	6.4	370,534	39.0	8.5	16,657	276,729	+1,955	+0.7	21.1	C. & W. C.
19,140,759	7,165,076	4.5	27,902,996	40.0	5.7	196,160	13,437,327	3,067,037	18.6	14.7	B. & O.
651,262	531,242	8.1	1,350,604	20.1	7.8	7,604	886,757	82,629	8.5	22.5	Bangor & Aroos.
.....	.....	...	.....	...	...	.....	233,816	64,437	21.6	8.5	Belt Ry. of Chic.
.....	.....	...	.....	...	...	.....	830,114	39,152	4.5	17.9	B. & L. E.
1,750,205	962,622	4.6	4,109,372	28.0	4.0	21,405	1,393,968	318,140	8.1	9.5	B. & A.
5,280,768	2,545,531	5.8	9,366,694	36.5	9.8	12,006*	5,346,308	+736,275	+15.9	16.2	B. & M.
43,859	106,572	2.9	82,321	63.0	87.0	50,475	773,827	+30,111	+4.1	8.5	B.-R. I.
964,952	441,464	5.5	2,065,311	16.5	4.7	82,443	887,968	306,863	25.7	8.5	C. of G.
3,014,832	1,308,388	5.2	5,333,883	35.5	4.3	53,346	1,966,542	550,093	21.9	8.9	C. of N. J.
490,752	285,953	6.9	1,253,446	30.0	4.9	38,084	550,905	56,204	9.3	11.6	C. V.
7,122,137	2,034,899	3.4	12,983,594	36.0	3.6	297,253	4,521,276	360,835	7.4	8.1	C. & O.
1,131,618	485,050	5.2	2,303,065	46.2	3.3	80,400	727,457	266,381	26.8	6.8	C. & E. I.
258,954	214,219	10.0	389,180	35.8	6.8	5,963	228,836	+13,081	+0.6	13.6	C. & I. M.
8,460,649	4,247,486	3.8	15,334,978	35.2	6.2	28,282	8,221,553	1,775,907	17.8	13.5	C. & N. W.
13,277,967	4,072,451	3.7	20,005,432	32.5	4.8	842,336	8,944,263	2,487,680	21.8	15.3	C. B. & Q.
1,371,158	530,999	4.6	3,458,416	16.5	2.2	168,747	815,522	175,597	17.7	7.0	C. G. W.
.....	.....	...	.....	...	...	.....	686,271	107,264	13.5	10.6	C. I. & L.
9,363,889	4,885,974	6.3	18,973,258	22.5	4.1	757,191	9,486,299	886,535	8.6	13.1	C. M. St. P. & P.
6,421,069	3,919,217	7.3	11,883,170	34.5	6.1	173,270	6,196,178	952,136	13.2	10.9	C. R. I. & P.
1,721,651	632,596	4.4	3,986,592	17.0	3.1	.....	763,182	112,000	12.7	5.8	C. St. P. M. & O.
346,012	269,908	9.3	666,725	36.0	9.3	73,971	590,394	83,826	12.4	22.1	Clinchfield
603,514	199,005	3.9	1,280,566	26.0	4.6	14,715	502,283	351,405	41.0	10.8	C. & S.
128,819	111,190	10.4	231,415	9.0	6.0	2,977	118,089	14,867	11.1	14.4	C. & G.
3,320,245	1,444,416	5.2	6,040,014	25.0	5.7	80,863	2,936,492	+21,353	+0.7	13.2	D. & H.
5,073,144	1,222,667	2.9	9,885,552	19.2	2.2	176,364	1,951,914	143,331	6.9	5.3	D. L. & W.
2,331,103	1,536,305	7.9	3,939,581	2.5	7.8	8,427	2,584,303	379,602	12.8	20.4	D. & R. G. W.
.....	.....	...	.....	...	...	.....	245,891	45,916	15.7	25.1	D. & S. L.
70,529	118,861	20.0	154,559	+53.0	12.5	2,331	167,663	27,334	14.0	27.5	D. & M.
80,222	73,467	11.0	182,707	47.5	9.4	6,144	147,177	+18,246	+14.2	11.8	D. & T. S. L.
216,299	370,026	20.2	496,500	+35.0	10.7	10,104	534,861	165,298	23.6	17.5	D. T. & I.
586,685	541,557	11.0	963,668	...	15.8	11,457	1,281,600	125,797	8.9	26.6	D. M. & N.
177,496	247,554	16.8	446,446	61.0	11.6	4,690	423,855	144,407	26.4	23.0	D. S. S. & A.
.....	.....	...	.....	...	...	.....	298,028	32,956	10.0	28.0	D. W. & P.
752,790	920,567	14.8	1,323,392	54.2	10.3	21,552	1,161,004	370,507	24.1	16.2	E. J. & E.
7,732,076	1,545,715	2.4	15,133,927	26.8	2.1	881,747	3,475,570	1,075,053	38.2	5.8	Erie
674,557	1,156,393	2.1	1,111,556	26.8	15.8	99,551	1,552,532	49,213	3.1	27.1	F. E. C.
.....	.....	...	.....	...	...	.....	158,342	+4,166	+2.6	23.8	F. S. & W.
539,060	327,170	7.3	1,029,917	40.0	5.5	9,460	467,091	478,954	50.6	12.8	F. W. & D. C.
500,248	358,801	8.6	998,632	25.5	5.5	16,567	478,289	94,780	16.5	17.1	Georgia
119 785	52,503	5.3	256,749	42.0	3.0	2,182	62,066	9,885	13.7	6.4	Ga. & Fla.
1,696,879	952,920	6.7	3,137,440	28.5	6.2	125,016	1,734,019	460,125	21.0	12.6	G. T. W.
.....	.....	...	.....	...	...	.....	6,292,160	959,192	13.2	14.1	G. N.
23,091	51,140	2.7	231,317	33.5	9.6	12,870	306,966	46,432	13.1	31.7	G. B. & W.
311,144	254,684	9.9	558,894	20.5	7.2	21,628	354,644	83,460	19.0	12.7	G. M. & N.
9,376,406	4,495,598	5.8	15,796,665	40.0	8.7	377,182	7,735,792	373,895	4.6	11.5	I. C.
.....	709,682	...	.....	...	...	5,140	1,429,717	142,901	9.1	19.1	K. C. S.
31,701	116,729	4.4	90,341	57.5	25.6	4,588	197,862	46,957	19.1	32.0	L. S. & I.
113,546	58,856	6.3	273,465	...	3.3	2,310	77,046	4,505	5.5	6.8	L. & H. R.
.....	.....	...	.....	...	...	.....	341,770	17,641	4.9	13.8	L. & N. E.
4,394,371	1,674,462	4.6	7,857,663	29.2	2.8	139,530	2,446,423	621,554	20.1	7.8	L. V.
369,631	297,996	9.6	644,821	47.2	10.3	5,024	560,197	113,252	16.8	19.5	L. & A.
58,050	75,063	15.4	136,898	30.2	8.8	1,688	101,213	+737	+0.7	17.4	L. A. & T.
4,038,533	4,485,016	13.3	8,793,110	38.0	11.5	750,720	9,342,132	+97,199	+1.1	18.0	L. & N.
1,190,491	1,012,789	10.0	2,459,329	14.5	7.2	.....	1,470,655	162,477	10.0	17.0	Me. C.
.....	.....	...	.....	...	...	.....	237,379	17,224	6.7	12.3	M. V.
943,201	534,186	6.8	1,658,013	23.0	5.8	.....	808,990	205,886	20.1	10.8	M. & St. L.
1,862,450	1,491,913	9.5	4,721,744	...	7.0	9,123	2,747,053	521,811	15.8	13.8	Soo
55,035	57,157	12.5	107,566	30.0	9.0	1,312	81,774	13,612	14.3	13.7	Miss. C.
.....	.....	...	.....	...	...	.....	150,603	5,123	3.3	17.8	M. & N. A.
.....	.....	...	.....	...	...	.....	118,922	32,143	21.4	16.4	M-I
3,098,340	1,373,458	5.3	5,016,102	...	7.1	34,959	2,993,801	561,361	15.8	15.6	M-K-T
8,256,588	4,187,811	6.1	14,407,764	41.2	5.1	184,335	6,269,089	1,336,287	17.5	11.6	M. P.
1,382,178	432,505	3.8	2,301,470	50.2	5.0	10,597	961,856	197,395	17.0	15.4	G. C. Lines
.....	.....	...	.....	...	...	.....	1,155,774	471,894	28.8	13.8	I. G. N.
709,107	449,212	7.6	1,478,647	22.5	7.6	53,237	568,802	6,364	1.1	8.1	M. & O.
.....	.....	...	.....	...	...	.....	284,758	36,877	11.4	19.2	Monongahela
199,270	119,290	7.2	271,334	28.0	6.4	26,492	169,781	+14,589	+9.4	17.1	Montour
1,156,151	761,642	8.0	2,364,941	30.2	6.1	.....	1,347,311	141,105	9.5	12.8	N. C. & St. L.
43,083	61,444	17.0	114,581	+74.0	10.0	105	96,888	22,760	19.0	29.1	N. N.
94,955	41,798	5.3	197,414	27.5	4.8	8,815	87,631	48,458	35.0	7.5	N. O. G. N.
.....	20,792,130	...	.....	...	...	640,617	30,621,097	4,516,593	13.3	12.8	N. Y. C.
.....	.....	...	.....	...	...	.....	394,157	43,850	10.0	8.7	L. H. Belt
.....	.....	...	.....	...	...	.....	2,044,890	+26,404	+1.3	18.1	P. & L. E.
2,976,236	1,406,339	5.7	5,972,257	20.5	4.7	40,646	2,378,808	420,979	15.0	10.4	N. Y. C. & St. L.
7,709,537	4,433,164	6.9	12,544,366	32.5	5.9	173,471	6,329,585	1,427,199	18.4	11.9	N. Y. N. H. & H.
1,114,142	567,312	6.1	2,119,651	...	4.1	130,008	852,210	12,882	1.5	11.3	N. Y. O. & W.
.....	3,410,625	...	.....	...	...	.....	4,720,270	563,539	10.6	12.5	N. & W.
.....	.....	...	701,205	+4.0	4.2	.....	248,714	64,314	20.3	6.5	N. S.
9,745,535	3,608,996	4.5	14,711,876	13.5	5.1	133,375	6,432,569	3,828,022	37.2	15.5	N. P.
280,235	303,642	13.0	563,693	33.0	10.6	3,701	544,152	59,558	9.9	17.8	Nw. P.
52,872,695	17,406,598	3.9	70,632,357	36.0	4.7	1,555,638	26,413,933	5,360,510	16.9	10.9	Penn.
2,158,596	705,531	3.9	3,152,370	3.0	37.7	32,883	811,026	+47,864	6.3	4.4	L. I.
1,843,281	632,894	4.1	4,287,021	38.5	4.0	113,459	1,538,530	598,282	27.0	8.5	P. M.
119,289	60,176	6.1	195,366	+24.0	5.1	601	83,474	17,779	17.5	12.5	P. & S.
.....	100,665	...	.....	...	...	3,069	126,446	26,046	17.1	14.0	P. S. & N.
13,279	69,077	64.0	216,138	51.4	5.6	2,750	102,458	52,775	34.2	5.9	P. & W. Va.
5,017,434	3,640,212	8.7	8,984,499	51.0	7.0	275,955	5,498,809	303,971	5.2	13.4	Reading
.....	.....	...	.....	...	...	.....	818,092	127,483	13.5	16.6	R. F. & P.
383,398	271,236	8.5	985,176	...	4.7	1,762	493,817	71,214	12.6	14.6	Rutland
4,469,104	2,292,306	6.2	9,236,779	21.9	3.9	54,867	3,067,408	1,313,893	30.1	8.7	St. L.-S. F. Lines
918,797	1,018,725	15.5	1,663,195	38.0	20.0	25,625	2,789,865	494,608	15.0	26.4	St. L. Sw. Lines
4,702,958	1,447,178	3.7	8,081,783	25.0	3.6	33,918	2,492,966	1,276,653	34.0	9.1	S. A. L.
.....	.....	...	.....	...	...	.....	67,852	4,363	6.0	8.5	S. D. & A.
7,720,107	3,466,713	5.4	16,387,653	25.0	4.0	190,457	5,522,138	1,197,571	17.8	7.2	Sou.
12,353,816	5,885,998	5.7	25,330,085	28.2	6.5	727,456	14,357,707	1,089,723	29.5	17.4	S. P.-P. Lines

* Rail only

Includes B. & A.; I. H. B.; P. & L. E. ⁵ Includes F. W. & R. G. ⁶ Includes A. G. S., C. N. O. & T. P.; G. S. & F.; N. O. & N. E.; N. A.

Table III — Materials and Supplies Used and

Road	Locomotive Fuel Used, 1932	Locomotive Fuel On Hand Dec. 31	Locomotive Fuel Days' Stock	Cross Ties Used, 1932	Cross Ties On Hand Dec. 31	Cross Ties Months' Stock	Rail—New and Relay Used, 1932	Rail—New and Relay On Hand Dec. 31	Rail—New and Relay Months' Stock
Southern Pacific-Tex. & La. Lines	$1,430,468	$395,690	100.0	$717,565	$730,789	12.3	$440,892	$1,030,635	28.2
Spokane, Portland & Seattle	281,408	25,407	33.0	108,850	21,190	20.3	28,527	85,773	36.4
Spokane International	.....	.....	...	.....	.....	...	.....	.....	...
Staten Island Rapid Transit	.....	.....	...	.....	.....	...	.....	.....	...
Tennessee Central	88,632	3,298	13.5	90,421	4,998	0.7	.....	.....	...
Texas & Pacific	.....	.....	...	.....	.....	...	.....	.....	...
Toledo, Peoria & Western	.....	.....	...	.....	.....	...	.....	.....	...
Union Pacific System[7]	8,474,241	836,988	36.2	1,465,176	3,419,622	28.1	336,573	2,093,078	70.5
St. Joseph & Grand Island	.....	.....	...	.....	.....	...	.....	.....	...
Utah	32,768	321	3.6	11,628	6,508	6.7	809	29,639	...
Virginian	468,841	11,234	8.6	163,670	304,328	22.2	193,286	85,872	5.3
Wabash	2,489,849	97,389	14.2	732,930	1,085,725	30.2	242,234	476,002	23.5
Western Maryland	571,796	45,659	29.2	231,792	282,591	14.7	475,741	79,027	2.0
Western Pacific	825,726	84,147	37.2	188,659	188,182	12.0	69,032	449,602	73.0
Wheeling & Lake Erie	312,924	11,274	13.1	62,957	142,247	27.4	36,309	94,102	31.0
Wichita Falls & Southern	13,944	788	20.6	34,424	7,167	2.5	.....	7,292	...
Wichita Valley	19,486	496	9.3	37,310	8,522	2.7	605	3,490	69.5
Total 87 Groups	$154,262,814	$14,911,529	36.2	$42,456,564	$54,366,073	14.8	$25,545,444	$39,010,580	18.0

[7]Includes O.-W. R. & Nav. Co.; O. S. L.; L. A. & S. L.

curred in railway supply stocks during the last 12 years is a result of reduced consumption and declining prices but particularly the vigorous and sustained drive which the railroads, working principally through well-organized supply departments have made on the inventory accounts. Although current inventories include abnormal amounts of undisposed scrap and although inventory values have not been brought down, in all cases, to present prices, the total figure on January 1 was the smallest since 1916 and it is necessary to go back still farther to find a counterpart for the quantities on hand, especially for supplies which are in frequent demand. At 5 per cent, the reduction in 1932 effected an annual saving in interest of $3,000,000, and the reduction since 1920 represents an annual interest saving of more than $20,000,000. If carrying charges, such as taxes, depreciation and handling costs, were considered, the savings would obviously be still larger.

The inventories on January 1 included approximately $20,200,000 of fuel, $67,500,000 of cross ties, $48,300,000 of new and second-hand rail, $170,200,000 of miscellaneous materials and a book value of scrap amounting to approximately $12,900,000. As nearly as can be determined, corresponding book values on January 1, 1932, were $21,200,000 for fuel, $80,000,000 for cross ties, $40,500,000 for rail, $12,600,000 for scrap, and $184,700,000 for miscellaneous materials.

Reductions General

Substantial inventory reductions were made by almost every railroad in 1932, and they amounted to more than 35 per cent in several cases. There was a reduction of $3,200,000, or 14.5 per cent, on the Santa Fe; $3,067,037, or 18.6 per cent, on the Baltimore & Ohio, not counting its Chicago terminal property; $1,775,907, or 17.8 per cent, on the Chicago & North Western; $2,487,680, or 21.8 per cent, on the Burlington; $1,075,053, or 38.2 per cent, on the Erie; $1,336,287, or 17.5 per cent, on the Missouri Pacific; $1,427,199, or 18 per cent, on the New Haven; $3,828,022, or 37.2 per cent, on the Northern Pacific; $5,360,510, or 16.9 per cent, on the Pennsylvania; $1,313,893, or 30.1 per cent, on the Frisco; $1,276,653, or 34 per cent, on the Seaboard Air Line; $1,197,571, or 17.8 per cent, on the Southern; over $2,700,000, or 27 per cent, on the Southern Pacific system, not counting certain fuel in storage; and over $2,000,000, or 13.3 per cent, on the Union Pacific.

The reductions made by other roads in their material balances and the major divisions of these balances, as well as statistics showing the amount of material consumed during 1932, are shown in one of the tables. These statistics have been classified to facilitate analysis and represent the values as reported to the *Railway Age*, except where the figures have been grouped to make the totals harmonize with the balance sheet account reported by the roads to the Interstate Commerce Commission. Since accounting practices are not exactly uniform the reports from each road may not be exactly comparable, and the tables should be examined with that in mind. To secure the greatest practical uniformity, however, the figures were collected with the understanding that, except where otherwise noted, (1) values reported on hand should include all new, second-hand and shop material and other usable machinery and equipment available and unapplied, including ties at treating plants, line stocks, working stocks, and supplies for A.F.E. and new construction, also material received but not paid for and (2) that the values used should include all materials, less stores expense, issued to closed operating and capital accounts and exclusive of transfers and credits. Where the tables do not show how the subordinate divisions of stock or consumption compare with the corresponding figures of the previous year, such comparisons may be developed by referring to the summary of inventory values for the year 1931, as presented in the *Railway Age* of May 7, 1932.

While the ratio which materials and supplies in stock bear to operating expenses is not universally favored as a measure of supply operations and its application is as vigorously opposed by some supply officers as a practice of expressing inventory values on a mileage basis, this index is not without value and has again been utilized in these reviews. It particularly has the advantage of being based on official corporation figures; it is also an index available for all roads. With total inventories equal to 10.2 per cent of the operating expenses, as compared with 8.9 per cent in 1931, 8.2 per cent in 1930 and 7.5 per cent in 1929, and with a ratio to operating expenses amounting to 13.1 per cent in 1932, compared with 11.5 per cent in 1931, 11.0 per cent in 1930 and 10.4 in 1929, it is seen that book values of material stocks have increased in relation to expenses and revenues, despite the heavy reduction made in the investment. This is attributed chiefly to the presence in the stock balances of quantities of material for which there has been no outlet, to the accumulation of obsolete materials which supply officers have been unable to charge against operating expenses at this time and to not writing down some inventory values to current prices.

The percentage of materials and supplies to operating expenses varies on different roads and ranged from 5.8 per cent to over 35 per cent in 1932. The percentage was 6.4 per cent on the Alton; 8.5 on the Central of Georgia; 8.1 on the C. & O.; 6.8 on the C. & E. I.; 7.0 on the C. G. W.; 5.8 on the Omaha; 5.3 on the D. L. & W.;

Carried by Class I Railroads in 1932 — Continued

Miscellaneous—Less Scrap						Scrap					
Used, 1932	On Hand Dec. 31	Months' Stock	Total Used, 1932	% Off 1931	Months' Stock On Hand	on Hand Dec. 31	Total on Hand Dec. 31	Decrease from Prev. Yr.	Per Cent Red.	Stock % of Op. Exp.	
$4,552,190	$2,360,235	6.2	$7,141,116	37.8	7.6	$55,495	$4,572,846	$1,627,694	26.2	16.7	S. P.-T. & L. Lines
932,803	210,178	2.7	1,351,590	3.5	3.1	15,832	358,720	126,977	26.0	10.1	S. P. & S.
.....	.....	...	.....	...	...	.....	98,094	9,168	8.5	16.9	S. Intern.
.....	.....	...	.....	...	...	.....	137,463	+31,845	+30.1	9.8	S. Is. R. T.
166,711	187,667	13.5	345,764	42.5	6.8	.....	187,581	80,017	30.0	12.9	T. C.
.....	.....	...	.....	...	...	.....	3,053,468	585,034	16.1	20.5	T. & P.
.....	.....	...	.....	...	...	.....	116,961	13,291	10.2	9.5	T. P. & W.
9,896,856	7,249,763	8.8	20,172,847	39.7	8.0	135,234	13,734,688	2,114,351	13.3	17.4	U. P.
.....	.....	...	.....	...	...	.....	122,668	61,580	32.4	8.0	St. J. & G. I.
55,281	145,396	31.4	100,487	22.5	21.8	1,058	182,924	17,173	8.6	25.1	Utah
1,719,599	1,393,644	9.7	2,545,397	...	8.4	22,062	1,817,142	172,112	8.7	26.8	Virginian
2,911,253	1,345,211	5.5	6,376,266	25.0	5.7	38,893	3,043,223	1,160,122	27.5	9.8	Wabash
1,438,278	918,892	7.7	2,717,607	20.0	5.8	51,375	1,377,544	351,005	20.8	18.4	W. Md.
601,838	1,142,545	22.8	1,685,255	...	13.2	35,526	1,900,012	355,812	15.8	21.0	W. P.
1,057,256	407,928	4.6	1,469,446	41.2	5.3	907	655,654	110,848	14.4	10.1	W. & L. E.
.....	.....	...	.....	...	...	.....	44,702	9,164	17.1	10.4	W. F. & S.
54,507	18,615	4.1	111,908	32.5	3.1	196	31,319	12,853	29.0	10.4	W. V.
$300,239,001	$138,078,674	5.5	$522,546,137	30.2	5.9	$10,259,928	$311,893,392	$55,019,775	15.5	13.0	

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5.8 on the Erie; 7.8 on the L. V.; 7.5 on the N.O.G.N.; 6.5 on the N. S.; and 5.9 on the P. & W. V. The extent to which these low ratios may be due to unusual practices as, for example, charging the cost of material to operating expenses when issued instead of when used, is outside the scope of this survey.

The tables also afford a comparison of supply operations on a basis of the rate of stock turnover. The rate is expressed by the number of days' or months' supply which different kinds of stock reported represent in terms of the average consumption during the previous 12 months; this index is less applicable to ties and rail and other intermittently-used materials than for material in continuous demand, but affords many interesting side lights on the prevailing conditions of stocks. If the consumption of material in 1932 had been normal, the inventories on January 1, after all the reductions which have been made, would clearly show an exceptionally high rate of turnover, but, with the consumption of 1932 averaging 30 per cent below that in 1931, the inventories show less turnover, in fact, than previously. Thus, on the basis of last year's consumption, fuel stocks on January 1, 1933, represented a 36 days' supply, as compared with 31 days on January 1, 1932. Tie stocks on January 1, 1933, represented a 15 months' supply, as contrasted with 11 months in January, 1932. Rail stocks on January 1, 1933, represented an 18 months' supply, as compared with a 9 months' supply on January 1, 1932. The stock of miscellaneous materials on January 1, 1933, represented a 5.5 months' supply as contrasted with 4.4 months on January 1, 1932, while total stocks, less scrap, represented 5.9 months, as compared with 4.5 months in January, 1932.

There was so little work done last year that some roads were left with some stocks, which, on the basis of current consumption, would last several years. Supply organizations are at present confronted with the necessity of carrying considerable stock for which there is little or no present demand but, in general, the present rate of turnover is probably a better index of the static condition of consumption than of the available supply of material for anything approaching normal requirements. Most of the rail inventory comprises, for example, second-hand rail which is of no value for important main tracks, and it is evident that a resumption of track maintenance will quickly absorb existing stocks of new rail and cross ties. It would doubtless be surprising to find how inadequate present material stocks are in many particulars to meet the requirements when they make themselves felt.

With an objective constantly in view of making these annual reviews of supply conditions of the maximum value to the railroads as a means of measuring their own progress, adjusting themselves to changing conditions and otherwise benefiting from comparative experiences, this review has been enlarged to include a table showing the quantities of fuel, ties, rail and scrap which a large number of railroads were able to report on hand January 1. The quantities, particularly those relating to scrap, are estimates in many cases and are not companion fig-

Table IV—Quantities of Selected Materials in Stock Dec. 31, 1932

	Fuel (Net Tons)	Rail (Net Tons)	Cross Ties (Number)	Scrap (Tons)
Akron, Cant. & Youngst'n	406	150	3,037	250
Alton	14,467	5,621	86,148	1,595
A. T. & S. F. Lines	732,007	114,004	4,112,216	
Baltimore & Ohio	238,579	79,943	1,872,790	32,690
Bangor & Aroostook	26,470	2,709	208,585	
Boston & Albany	19,699	6,166	151,125	3,457
Boston & Maine	39,445	15,557	1,400,665	3,262
Burlington-Rock Island	373,478		102,334	
Central of Georgia	19,776	7,710	200,717	
Central of New Jersey	10,395	7,288*	251,871	6,145¶
Central Vermont	4,353	1,399*	48,819‖	3,334¶
Chesapeake & Ohio	193,334	41,975	632,542	18,545
Chicago & Eastern Ill.	13,610	2,119	98,799	10,634
Chicago & Illinois Mid.	712	106	2,740	
Chicago & North Western	203,665			
Chicago Great Western	2,167	3,130*	25,416	22,294
Chi., St. P., Minn. & O.	23,549	5,868	227,218	
Clinchfield	2,902	4,435	150,831	8,362
Colorado & Southern	18,225	4,381*	171,134	1,462
Columbus & Greenville	271	88	2,004	373
Delaware & Hudson	185,233	8,527	236,183	
Del., Lack. & Western	45,637	8,530	191,566	16,825
Den. & Rio Grande West'n	19,825	20,274	563,090	2,058
Detroit & Mackinac	1,724	560*	29,455	466
Detroit & Toledo Sh. Line	815	724	28,283	686¶
Det., Toledo & Ironton	265	2,475	43,777	1,593
Dul., Missabe & North'n	45,010	4,711	236,510	769
Elgin, Joliet & Eastern	15,087	3,429	60,554	2,929
Erie System	82,043	13,128	520,975	72,639
Florida East Coast	138,646	6,690	33,920	12,783
Fort Worth & Den. City	15,210	728*	65,108	3,365
Georgia	3,662	940	39,356	2,070
Georgia & Florida	561	183	11,861	317
Grand Trunk Western	23,073	16,766	51,788	13,322
Gulf, Mobile & Northern	1,013	4,461	15,630	
Illinois Central System	130,270	49,622	1,288,150	48,000
Lake Sup. & Ishpeming	7,630	790	31,588	491
Lehigh & Hudson River	1,208	197	2,536	
Lehigh Valley	30,675†	8,607	176,485	15,325
Long Island		1,608	10,671	
Louisiana & Arkansas	50,211	3,525	205,545	762
Louisiana, Ark. & Texas	138,351			
Louisville & Nashville	107,444	61,324	1,855,525	
Minneapolis & St. Louis	9,887	5,672	111,026	
Missouri & North Ark.	576		3,056	
Mobile & Ohio	11,441	1,752	19,373	
Montour	470	510	750	2,081¶
New Orleans Grt. North'n	83	428	41,677	
New York, Chi. & St. L.	16,806	4,051	439,874	4,584
New York, New Haven & Hartford	149,439	20,113	549,843	50,198¶
Northern Pacific	122,871	35,282	1,264,145	
Northwestern Pacific		3,838*	26,679	425
Pennsylvania		71,782	3,571,761	
Pere Marquette	42,608	9,526	385,512	
Pittsburg & Shawmut	1,729	1,069	275	
Pittsburgh & West Virg.	3,284			
Reading System	30,671			
Rutland	11,753	4,365	84,000	
Seaboard Air Line	44,392‡	22,746*	634,145	7,243
Southern	134,337	31,641	1,055,876	18,667
Tennessee Central	2,644		4,581	
Union Pacific System	329,025	75,637*	3,316,806	23,021
Utah	280	1,227	6,125	376
Virginian	8,258	2,766	319,380	1,635
Western Maryland	32,565	2,634*	281,269	4,578¶
Western Pacific	27,789	14,196*	298,813	
Wheeling & Lake Erie	8,858	2,522*	107,129	245
Wichita Falls & South'n	763	296*	7,239	
Wichita Valley	670	117*	8,562	56
Total	3,972,303	832,618	27,985,443	419,912

† Coal. ‡ Ex. fuel oil. * Gross tons. ‖ All ties. ¶ Gross tons.

ures to the balance sheet accounts and should not be so considered. This will appear when it is considered that coal accounts usually include variable freight charges and often terminal handling charges; that tie values often include, besides variable freight charges, the cost of treatment; that rail values include variable values at which second-hand material is included in the accounts and that different roads place different values on the scrap in their accounts. It is largely for this reason that it has seemed desirable to supplement the inventory accounts with data that would more readily represent the actual quantity on hand. The summary shows 832,618 tons of new and second-hand rail in stock and 27,985,443 cross ties on railroads operating 126,000 miles of line, and also 419,912 tons of unsold scrap iron on railroads operating 68,000 miles of line.

Pennsylvania Earns 2 Per Cent on Stock

THE Pennsylvania, the annual report of which was issued last week, in 1932 had railway operating revenues of $331,393,457, a decrease of $116,696,821, or 26 per cent, compared with the previous year. The decrease from 1929 was $351,309,474, or approximately 52 per cent. The success of the management in reducing expenses in even greater proportion than the decline in revenues is reflected in a reduction of $110,854,328 in operating expenses, or 31.4 per cent, compared with the previous year. The decrease from 1929 was 50.9 per cent. The operating ratio was reduced from 78.7 in 1931 to 73 in 1932.

After all obligations were met, there remained net income for the year of $13,573,536, which was equivalent to $1.03 (or over 2 per cent) per share on the capital stock. Out of this net income the directors declared a dividend of 50 cents per share, equivalent to one per cent, which was paid on March 15 of the present year, thus maintaining the company's dividend record which has continued unbroken since 1847.

In Table I are shown comparative figures of revenues and expenses for 1932 and 1929. The close parallel between the reductions in most items of expense with those in revenues will be noted, the striking exception being maintenance of way expenses, taxes, fixed charges and, of course, net income. The high maintenance standards of former years are standing the company in good stead in making possible a reduction in maintenance of way expenses at the present time which is much larger than the decline in the volume of business.

Table II shows similar comparisons between 1932 and 1929 of selected operating statistics. The average load per freight car and per freight train, it will be noted, declined somewhat, as could be expected with the maintenance of scheduled services in a period of extremely light traffic. The speed of freight trains showed a sharp improvement, in keeping with the continued betterment in service which the road is offering to its patrons.

The almost exact parallel of the decline in the volume of passenger traffic with that in freight possibly may indicate that at last this business is stabilized to a point where it will in future fluctuate more in harmony with general business rather than fall off continually. Nevertheless, the figures show the seriousness of the passenger traffic problem even on the Pennsylvania, which has heretofore handled this business at a comparatively favorable operating ratio. The volume of passenger traffic was held to a loss equivalent to that in freight only by rate concessions averaging 17.3 per cent, as compared with 6 per cent in the case of freight traffic. Moreover, the decrease in passengers per car and per train is arresting in its magnitude.

The report notes the fact that the company's extensive program of improvements on various portions of the system was continued, but on a reduced scale as a result of economic conditions. Electrification was completed between New York and Philadelphia, which, with work previously finished, affords electric operation of passenger trains between New York and Wilmington, Del. The system now has 392 miles of line and 1,287 miles of track electrified. Progress continued on the new passenger station facilities at Philadelphia and Newark, N. J.; on the Baltimore improvements; on the track elevation and grade crossing elimination at Chicago; and on the new Union Terminal at Cincinnati. During the year 52 electric passenger locomotives and two electric freight locomotives were placed in service. The company is building 1,285 steel box cars in its shops.

Table I—Pennsylvania R. R.—Selected Figures From Income Account, 1932 and 1929 Compared

	1932	1929	Decrease Per cent
Freight revenues	$235,347,937	$482,896,402	51.3
Passenger revenues	59,738,930	129,583,664	53.9
Total operating revenue	331,393,457	682,702,931	51.5
Maintenance of way expenses	26,457,503	87,847,375	69.9
Maintenance of equipment expenses	65,274,608	131,642,780	50.4
Transportation expenses	122,648,842	235,190,936	47.9
Total railway operating expenses	242,011,602	493,150,592	50.9
Net revenue from railway operations	89,381,854	189,552,338	52.9
Tax accruals	28,231,430	40,518,595	30.3
Railway operating income	61,075,198	148,945,017	59.0
Net railway operating income	49,132,038	133,139,626	63.1
Gross income	95,731,429	181,931,126	47.4
Deductions from gross income	82,157,893	80,552,607	*2.0
Net income	13,573,536	101,378,518	86.6

* Increase.

Table II—Pennsylvania Regional System—Selected Operating Statistics, 1932 and 1929 Compared

	1932	1929	Decrease Per cent
Gross ton-miles (thousands)	64,645,820	115,596,005	44.1
Revenue ton-miles (thousands)	25,225,675	49,174,162	48.7
Gross tons per train	2,190	2,362	7.2
Net tons per train	929	1,095	15.2
Revenue per train mile	$8.07	$10.10	20.1
Revenue per ton-mile	$0.934	$0.994	6.0
Per cent loaded to total car miles	60.9	63.2	3.6
Train-miles per train-hour	14.1	11.9	*18.5
Average load per car (tons)	28.0	30.9	9.3
Pound of coal per 1000 gross ton-miles	128.0	125.0	*2.4
Passengers carried one mile (thousands)	2,190,742	4,234,747	48.3
Revenue per passenger train-mile	$1.81	$2.19	17.3
Revenue per passenger-mile	$2.729	$2.173	14.0
Average passengers per car	10	14	28.0
Average passengers per train	49	69	28.9
Average passenger journey (miles)	35.9	37.2	3.5

* Increase.

Approximately 90 per cent of all freight trains now operated are regularly scheduled. Store-door collection and delivery of freight was established experimentally at a number of points on the line and, such service says the report, "will be extended as conditions warrant." Further progress was made in co-ordinating rail and highway service, and in the use of containers, demountable truck bodies, self-propelled equipment and specialized types of equipment for the more efficient handling of certain commodities.

General W. W. Atterbury, president of the road, in his discussion of present conditions said:

"The railroads will continue to be the basic transportation agencies of the country. They fully appreciate that informed public opinion desires to have them accorded fair treatment, and are confident that intelligent consideration of their present situation will result in such legislative and regulatory relief as will insure them equality of opportunity to engage profitably in any kind of transportation service desired by the public."

Use of Unit Heaters in Shops and Enginehouses Has Advantages*

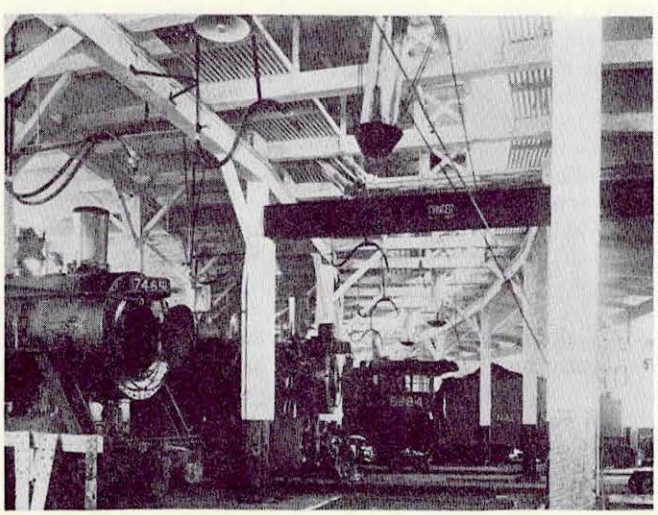
A. R. E. A. committee finds that decentralized heating systems are superior in some respects to direct radiation and the central fan system

BEFORE the development of unit heaters, industrial heating was customarily accomplished by the use of direct steam or hot water radiators or by the centralized fan system of hot air heating. In order to simplify the piping and to conserve floor space when installing direct radiation systems of heating, the radiators are usually placed close to the walls, a practice that causes the warm air to rise along the walls to the highest point of the building. As a result the warmest part of the building is under the roof, and adjacent to the radiators along the side walls, while the temperature in the center of the building is usually much lower.

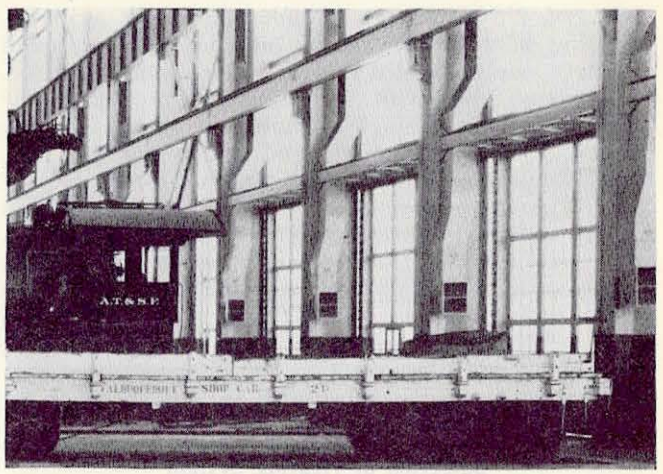
To correct this unequal distribution of heat, the central fan system of hot air heating was developed. This system consists of a large fan blowing or drawing air through a bank of heating coils, the heated air being distributed to different parts of the building through ducts or pipes. This system is an improvement over the use of direct radiation or pipe coils as it maintains a more uniform temperature throughout the building. However, the large air ducts required obstruct light, interfere with crane clearances, and are very expensive. While the objection of interference can be overcome by placing the ducts underground, this procedure further increases the expense, both in first cost and in operating cost, owing to heat losses through the ground.

To overcome the limitations of these two systems in the field of industrial heating, a method of decentralized hot air heating was developed through the use of small fan heaters which could be located at different points throughout the building. These small heaters, which have been developed in many different types, are known as "unit heaters."

* Abstracted from a report presented at the annual convention of the American Railway Engineering Association at Chicago on March 14 and 15 by the Committee on Shops and Locomotive Terminals.



Example of Heating an Enginehouse by Direct Radiation Placed Overhead



Interior of Locomotive Shop Heated by a Centralized Fan System

The chief advantages of unit heaters over direct radiation are that they circulate the air in buildings, reduce condensation, promote uniformity of temperature, permit quick heating, reduce the number of heating fixtures, simplify piping and installation, and provide a system which is readily controlled, either automatically or manually. Their advantage over the centralized fan system is in the elimination of expensive duct work. When desired, the unit heaters may also be used as a means of improving working conditions by circulating the air in the buildings during hot summer weather. For these reasons, unit heaters are very adaptable to all shop and locomotive terminal buildings.

Description

The unit heater is composed of a heating unit or radiator enclosed in a housing in which an electrically driven fan or fans of either the propeller or centrifugal type are mounted. The fans draw or force the air through the heating unit or radiator, discharging the heated air into the room at various velocities. The directional flow of the air is controlled by dampers, louvers, screens or short ducts.

The items comprising the various types of unit heaters and the materials of which they are made vary considerably with the different ideas of the manufacturer. In general, the heating element consists of seamless copper or brass tubing, with copper fins helically wound around them. The tubing is fused or screwed into headers of cast brass, cast bronze, cast aluminum, cast iron or cast steel. These units are tested under hydrostatic pressures varying from 250 to 1,000 lb. per sq. in.

The fans are made of either sheet steel or some kind of corrosion-resisting material. The disc or propeller type is mounted behind the heating shaft, and with this type the fan and motor are located behind the heating

unit and in the path of the air current. The centrifugal type is mounted on a shaft extending the full length of the heater and the motor is located on a bracket to one side and out of the path of the air current, but in this type the fan casing must have sufficient strength properly to support the bracket.

The motors are of standard design and of constant or variable speed as may be desired. They are either open or fully enclosed, depending upon the type of fan. The open type is usually used with the centrifugal fan and the fully enclosed with the propeller type. They are equipped with ball, roller or sleeve bearings and also with thrust bearings when used with propeller type fans.

Types of Unit Heaters

Several different types of unit heaters are available, including floor types with air up-take and horizontal discharge, the suspended type with horizontal discharge, and ceiling types with vertical downward discharge. They are made with single or multiple outlets. In single outlets, the air can be discharged in only one direction, but the multiple outlet type will permit air to be discharged in two or more directions. Heaters are designed for use with low or high pressure steam, hot water, gas, and electricity. In the gas unit, the heating medium consists of a gas burner that passes the products of combustion through tubes, which transfer heat directly to the air. The electric units are similar in design to the other types, with the exception that in this case an electric heating element is substituted for the steam or hot water radiator in the other types.

Selection of Heating System

As previously stated, unit heaters may be used with either low or high pressure steam, hot water, gas or electric systems of heating, the system chosen usually being dictated by local conditions. On account of the fewer number of unit heaters which would be required by the use of steam, it is generally conceded to be the most economical system to use. There are, of course, exceptions, such as cases where long runs of supply and return piping would have to be constructed and maintained so that the use of steam would not prove as economical as gas or electricity, if they were available. Whenever gas heaters are used, care must be taken to see that they are properly vented to the outside atmosphere.

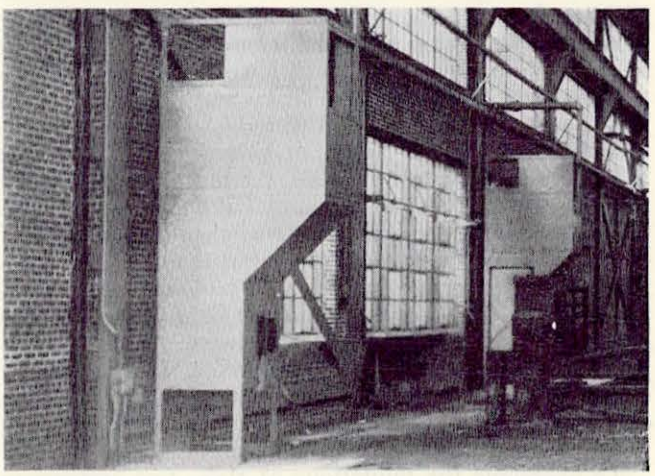
A high-pressure steam system is cheaper in first cost, for fewer unit heaters and smaller piping will be required as compared to a low-pressure steam system, which requires more unit heaters and larger supply and return piping. Operating at lower temperatures, however, gives more uniform and efficient heating, and the operating economies thus effected will offset the difference in first costs. The higher the air temperature being discharged through the heater, the greater the tendency for the air to collect in the upper part of the building. This results in a lack of sufficient heat in the working part of the building and a material waste of heat by excessive losses through the roof and upper exposures. The two most common systems employed are the low-pressure, two-pipe system and the low-pressure vacuum system.

Size and Selection of Unit Heaters

The number and size of the unit heaters are determined by computing the heat losses from the building as is done in all heating problems. If it is intended only to re-circulate the air and not provide for any air changes, the calculations will be made in the same manner as for direct radiation. If all or a portion of the air is to be taken from the outside, the heat necessary to bring this air up to the temperature of the inside air must be added to the transmission or other losses. The number and sizes of heaters will then be determined by the number of air turnovers desired and the temperature required. The greater the number of air turnovers the better the results, because the unit heaters can operate at lower outlet temperatures with the result that the air does not rise to the upper part of the building as rapidly as would be the case with higher outlet temperatures. Operating at lower temperatures with a greater number of air turnovers permits more economical operation through a saving in fuel. The number and size of heaters may be obtained from the manufacturers' rating tables which are based on the steam pressure to be used and the temperature at which the air will enter the heater.

Steam at a pressure of two pounds per square inch and air entering at 60 deg. F. are used as the standard basis of rating. Where air is taken from the outside at a temperature below freezing, the steam pressure on the heating surface should be not less than five pounds per square inch.

The different kinds of unit heaters now available may be divided into two classes, the suspended type and the floor type. With the suspended unit heater it is possible in many instances, where clearances will permit, to use overhead return lines and avoid the expense of pipe trenches and underground lines in basements or in single-story buildings without basements. In some cases the use of overhead return lines, where the run is short and sufficient elevation obtains, will permit dispensing with a basement boiler room. In determining this feature, the manufacturers' published recommendations for piping should be followed closely.



Unit Heaters in a Locomotive Boiler Shop

Disadvantages

Offsetting the above advantages is the fact that the suspended type of heater is required to force the heated air down to the working zone, which is contrary to the laws of nature. Therefore, the higher the unit is above the floor line, the greater will be the volume and velocity required to bring the heated air down to the working zone.

The floor-type unit heaters can be operated more economically because they take full advantage of the laws of nature. In this type, the cool air from the floor is drawn in through the air intake at the floor line and after passing through the heater is discharged just above the head line. This keeps the warm air circulating within the working zone and lessens the tendency for the heated air to accumulate in the upper portion of the building. This is a very important feature in buildings where over-

head cranes are used, for the working conditions of the crane operators must be considered. In the case of existing buildings where the piping is overhead, or where other conditions require the use of suspended unit heaters, greater fuel economy will result if they are equipped with re-circulating ducts through which air can be drawn from the floor level.

The heaters should be so located that the heated air will not be discharged any higher above the floor line than is absolutely necessary. The ideal arrangement is to place the bottom of the warm-air discharge about ten feet above the floor line. This provides head room where suspended heaters are used, and in both types permits discharge of heated air above the heads of the occupants. The unit heaters may be located in practically any part of the building, provided the inlet and discharge are free and unobstructed. As a general rule, the heaters should be placed in such a position that the heated air will be discharged toward the exposed walls of the building.

Unit Heaters for Enginehouses

The use of unit heaters in enginehouses presents a different problem from that of the ordinary type of shop building. In enginehouses, better results are obtained by reversing the procedure, that is, by placing the cool air intake at the top of the working zone and discharging the heated air through ducts into the pits or at the floor line. If this is not done and the cold air taken from the floor line, there will be an excessive inflow of cold air with the opening of the enginehouse doors, and this cold air seeking the lowest level creates an objectionable condition in the pits and at the floor line. This objectionable condition is further increased by the loss of warm air through the smoke jacks and roof ventilators, which work against the heaters and prevent the warm air being brought down to the floor line and recirculated.

The heaters and ducts should be constructed entirely of corrosion-resisting materials in view of the sulphur gases to which they will be subjected. The intake of the heater should be located not more than seven to ten feet above the floor in order to avoid the circulation of gas laden air which tends to collect in the upper part of the building.

Satisfactory results are obtained with heaters located beneath the floor in a small extension on the rear end of the engine pit. In such installations, a grating is provided in the enginehouse floor through which the cool air is drawn into the chamber, passed over the heater coils and discharged into the pit. Heaters located in this manner, however, will require underground piping and, in addition, they are subject to possible damage from water backing up in the pits or flowing in when floors are being flushed down, and they should therefore be equipped with fully enclosed and waterproof motors.

The fans should be manually controlled, so they may be shut off if desired by the men working in the pits. Heaters placed above the floor with ducts leading into the pits may be equipped with a damper in the duct, so warm air may be diverted from the pit when desired and discharged above the floor line.

Unit heaters are particularly well adapted to enginehouses where direct steaming is used. Under these conditions it is not always necessary to provide a heating plant of sufficient capacity to heat the entire house. A certain amount of radiant heat is given off by the locomotives under steam, and the elimination of smoke jacks greatly reduces the heat losses. Under some conditions, this is sufficient to justify omitting the heating plant entirely. This, of course, depends on climatic conditions and the number of locomotives which will be in the house at one time and under steam. Where the heat from locomotives will not provide for satisfactory working conditions, the deficiency can very readily be made up by utilizing unit heaters. They can be operated individually as the occasion demands, thereby providing a very flexible and economical method of heating.

Automatic Control

There are two general methods of control that may be used. One is to control the fan or fans individually or in groups by the use of room thermostats. The other is to control also the steam supply to the individual or group of units by a thermostatically controlled steam valve. This method of control is sometimes provided to protect workers near the heater from discomfort caused by the radiant heat expelled by the heater coils.

Consideration should be given to the degree of quietness required for the individual operation. Fan speed cannot be considered as a measure of quietness for fans of different design and sizes. Quietness is a function of kind, diameter, shape of blades and other variables besides speed, and all these must be given consideration.

Rate Hearings Begin April 24

(Continued from page 547)

over considerable areas and embracing sufficient traffic to have appreciable revenue effects are desired. Where possible, it should be shown whether reductions made were for the purpose of meeting other form of transportation (truck or water), to meet the competition of other rail carriers, or for the purpose of stimulating traffic by lowering the level of rail transportation charges.

(9) In order to develop as adequately as possible the probable effect upon respondents' revenues and volume of traffic of proposed reductions in rates and charges as a whole or on particular commodities or descriptions of traffic moving in substantial volume, the following questions should be answered, in each case giving the facts upon which conclusions or opinions are based and from which the commission may reach its own conclusions:

(a) If rates as a whole or on particular commodities or descriptions of traffic, either in the country as a whole or in particular rate groups, are reduced, how much additional tonnage is likely to result therefrom; to what extent will such tonnage offset the loss in revenue resulting from the rate reduction; and how will the net revenue be affected?

(b) Show the effect of particular rate reductions on prices to purchasers or consumers and on the volume of consumption, giving concrete examples.

(c) Shippers or others who propose reductions on particular commodities should show what general changes in prices on such commodities have taken place since January 1, 1925. If possible, price index numbers from some competent authority by years should be furnished. To what extent has consumption of such commodities responded to changes in price in that period? If possible, furnish statistics of commodity sales from some competent authority comparable with the price index numbers furnished.

(10) If reductions in rates are found to be warranted, (a) should such reductions be made general and applied to all rates, or (b) should readjustment be required in the rates on specified commodities or descriptions of traffic?

The purpose of the hearing is to elicit the facts upon which the proceeding must be decided, the notice says. Argumentative discussion will be out of place at this hearing—question of law or policy must be deferred until the time fixed for argument before the commission, which will be shortly after the close of the hearings. Those seeking reductions will proceed first. It is not necessary to file intervening petitions. All persons who appear and offer material evidence within the scope of the issue as above defined and limited will be heard. Every effort will be made, however, to expedite the proceeding and to confine the evidence within reasonable limits. To this end it is desired that evidence be presented as concisely as possible, using exhibits to the greatest possible extent to curtail oral testimony.

I. C. C. Nominates Panel of Trustees

WASHINGTON, D. C.

UNDER the new bankruptcy act of March 3, the Interstate Commerce Commission has the new power of conferring upon certain persons the distinction of being certified as qualified to operate the business of a railroad. This certification is made by the commission by selecting and designating a panel of standing trustees from which a federal judge may appoint a trustee or trustees to take charge of the business of a railroad which files a petition stating that it is insolvent, or unable to meet its debts as they mature, and desires to effect a plan of reorganization under the new law. The appointment is to be made temporarily at first but after a hearing within 30 days the judge may make the appointment permanent, or may terminate it and appoint a substitute or additional trustee or trustees in the same manner. The trustee or trustees and their counsel receive such compensation as the judge may allow within a maximum approved by the commission.

Three railroads have so far taken advantage of the new law by filing reorganization petitions, the Missouri Pacific, the Akron, Canton & Youngstown, and the Minarets & Western, and the commission has notified the judges of the selection of 20 names of those available as trustees, expressing the "present view" that the salary should not exceed $25,000.

The first list of 12 names was telegraphed to Judge Faris at St. Louis on the day the Missouri Pacific petition was filed and included L. W. Baldwin, president of the railroad company, as well as 11 lawyers, having offices in the territory served by the road, although several of them also have offices and spend a large part of their time in Washington. When the other two petitions were filed four additional names were placed on the panel for each, including an officer of each of the railroads and lawyers in the territories served, but it is understood that all of the names are available and it is planned to add more names as other railroads signify their intention to undergo reorganization so that there will be a constantly-growing list from which judges may make the appointments.

The names so far announced include some well-known and some not so well-known practitioners before the Interstate Commerce Commission and several former holders of public office. Few of them are known for experience in railroad operation. In some cases trustees may be appointed to succeed present receivers but it may be some time before railroads in receivership take advantage of the law because receivers can borrow from the Reconstruction Finance Corporation whereas in the present law there is no provision for loans to trustees. The panel of trustees as so far announced includes the following:

C. B. Ames is a member of the law firm of Ames, Cochran, Ames & Monnet, of Oklahoma City, Okla., and is president of the American Petroleum Institute. He began the practice of law at Macon, Miss., and later became general counsel of the Texas Company. In 1916 he was president of the Oklahoma State Bar Association. From 1919 to 1920 he was assistant to the attorney general of the United States.

L. W. Baldwin has been president of the Missouri Pacific since 1923 and has been in railroad service since 1896, beginning as chainman with the Illinois Central. He was designated by Judge Faris to continue the operation of the Missouri Pacific pending further order before the list of trustees was made up.

James C. Davis, now practicing law at Des Moines, Ia., was formerly director general of railroads for the United States Railroad Administration. He entered railway service in 1903 as attorney for the Chicago & North Western at Des Moines and later served as its general solicitor.

F. F. Faville, Des Moines, Ia., has been a judge of the Iowa supreme court since 1921. He practiced law for several years at Sioux City, Ia., and later was United States attorney for the northern district of Iowa.

R. C. Fulbright is president of the Houston Compress Company, Houston, Tex., and also engaged in the practice of law at Washington. He was formerly a railroad attorney and for many years has been prominent in practice before the Interstate Commerce Commission, usually representing the interests of shippers. He is chairman of the legislative committee of the National Industrial Traffic League.

Chester I. Long is a member of a law firm of Wichita, Kan., and also of the firm of Long, Chamberlain & Nyce, Washington, D. C. He was a member of Congress from Kansas in 1895-1897 and from 1899 to 1903, after which he served a six-year term as Senator.

James A. Reed, now practicing law at Kansas City, Mo., served three terms as a United States Senator from Missouri. He practiced law for several years at Cedar Rapids, Ia., was for some time prosecuting attorney of Jackson county, Mo., and for two terms mayor of Kansas City.

Guy A. Thompson has been a member of the law firm of Thompson, Mitchell, Thompson & Young at St. Louis, Mo., since 1929 and has practiced law at St. Louis for many years.

Huston Thompson, of Denver, Colo., and Washington, D. C., was formerly a member and at one time chairman of the Federal Trade Commission and has recently represented President Roosevelt in presenting the bill providing for federal supervision of security issues before Congressional committees.

H. B. Stewart, of Akron, Ohio, is president of the Akron, Canton & Youngstown.

James R. Garfield, a son of the late President James A. Garfield, has practiced law at Cleveland since 1909. In 1902 and 1903 he was a member of the United States Civil Service Commission, from 1903 to 1907 he was commissioner of corporations in the Department of Commerce and Labor; from 1907 to 1909 he was Secretary of the Interior in President Roosevelt's cabinet, and during the war he was director of the United States Fuel Administration.

Allen P. Matthew is a member of the law firm of McCutchen, Olney & Greene, of San Francisco. He was formerly an examiner for the commission under the late Commissioner Franklin K. Lane and for many years has been a practitioner before the commission.

George R. Sykes is superintendent of the Minarets & Western Railway at Pinedale, Calif.

Max Thelen, now practicing law at San Francisco, was formerly chairman of the California Railroad Commission; in 1916 was president of the National Association of Railway Commissioners, and under the Railroad Administration in 1919 was director of the Division of Public Service. From 1906 to 1911 he was attorney for the Western Pacific.

The panel of trustees also includes C. H. Moses, of Little Rock, Ark.; Earl F. Nelson, St. Louis, Mo.; George C. Willson, St. Louis, Mo.; W. L. Day, of Cleveland, Ohio; and W. C. Fankhauser, of San Francisco.

NEWS

Rail Bill in Canada Making Slow Progress

Liberals oppose trustees and arbitral tribunal, but without success

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Liberals (the minority party) are still fighting over the provisions which they argue give sweeping powers to the new board of trustees and they fear that that board, which they call irresponsible and which they contend is not responsible to Government or Parliament, will at different times order the abandonment of various Canadian National lines without the representatives of the particular communities affected having a chance to state their case in favor of retention of such service. Putting these fears into concrete form one of their members, Ross W. Gray, an Ontario Liberal, moved an amendment calling for the addition of a safeguarding clause to place a curb upon the trustees in their economy measures taken independently of those which might be undertaken in conjunction with the C. P. R. and which, if a dispute should arise, would be taken to the arbitral tribunal. Both Premier Bennett and Hon. Robert J. Manion, Minister of Railways, thought such a safeguarding measure needless and refused to accept it.

Then an attempt was made by one of the Labor members, A. A. Heaps of Winnipeg, to amend the bill to provide that all employees of the railways deprived of their jobs because of the economy moves should be compensated by the federal treasury. This amendment was ruled out of order by the chairman of the committee. His ruling was appealed from by Mr. Heaps, but the ruling was sustained, the Liberals and Labor members, at the time in the committee numbering only 21, against a Government vote in committee of 49. Dr. Manion, Minister of Railways, in rejecting this plea on behalf of labor, declared that private corporations should take care of their own men in times of depression.

Some time ago and as a result of a conference in January between the federal and the various provincial governments a questionnaire was drafted and sent by Dr. Manion to the provincial governments seeking their attitude on what steps could be taken to curb motor competition with the railways. Answering a question from a Manitoba member the Minister of Railways said no replies had yet been received, but he admitted most of them had stated at the conference that they were not favorable to increasing the charges against motor vehicles for use of the highways, declaring that their charges were already regarded as too high. He told the committee, though, that already the railways had moved to meet the highway competition, that in Western Ontario they had arranged for collection and delivery on their lines between Toronto and Windsor and Toronto and Sarnia.

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The Interstate Commerce Commission has postponed from April 17 to April 24 the date for resuming hearings before Examiner Boles in connection with its investigation of the Seatrain affairs.

SELECTED INCOME AND BALANCE-SHEET ITEMS OF CLASS I STEAM RAILWAYS†

Compiled from 143 reports (Form IBS) representing 148 steam railways
TOTALS FOR THE UNITED STATES (ALL REGIONS) ‡

For the month of January 1933	1932		Income Items
$13,360,619	$11,301,679	1.	Net railway operating income.
13,924,325	15,306,580	2.	Other income.
27,284,944	26,608,259	3.	Total income.
10 535,416	10,228,674	4.	Rent for leased roads.
44,362,929	43,789,606	5.	Interest deductions.
1,989,005	2,028,466	6.	Other deductions.
56,887,350	56,046,746	7.	Total deductions.
d 29,602,406	*d* 29,438,487	8.	Net income.
		9.	Dividend declarations (from income and surplus):
45,000	120,200	9-01.	On common stock.
289,912	695,959	9-02.	On preferred stock.

BALANCE-SHEET ITEMS

		Balance at end of January 1933	1932
	Selected Asset Items		
10.	Investments in stocks, bonds, etc., other than those of affiliated companies (Total, Account 707)	$766,948,976	$795,464,755
11.	Cash	272,885,202	279,274,837
12.	Demand loans and deposits	32,225,387	44,856,088
13.	Time drafts and deposits	35,138,636	36,285,398
14.	Special deposits	22,641,696	47,308,266
15.	Loans and bills receivable	13,294,697	14,179,572
16.	Traffic and car-service balances receivable	43,594,175	49,955,312
17.	Net balance receivable from agents and conductors	35,926,074	41,227,248
18.	Miscellaneous accounts receivable	133,267,547	159,747,537
19.	Materials and supplies	315,085,937	370,999,452
20.	Interest and dividends receivable	31,483,835	31,659,503
21.	Rents receivable	1,797,988	2,020,813
22.	Other current assets	9,543,124	14,082,150
23.	Total current assets (Items 11 to 22)	946,884,298	1,091,596,176
	Selected Liability Items		
24.	Funded debt maturing within six months*	228,610,160	95,588,448
25.	Loans and bills payable	304,973,676	258,358,513
26.	Traffic and car-service balances payable	57,595,062	67,328,617
27.	Audited accounts and wages payable	201,738,065	245,494,979
28.	Miscellaneous accounts payable	56,981,503	50,892,606
29.	Interest matured unpaid	163,802,727	134,624,851
30.	Dividends matured unpaid	9,009,932	14,218,594
31.	Funded debt matured unpaid	54,195,701	52,397,661
32.	Unmatured dividends declared	7,640,375	14,580 371
33.	Unmatured interest accrued	108,828,874	107,660,794
34.	Unmatured rents accrued	21,936,479	21,378,757
35.	Other current liabilities	10,917,963	18,354,310
36.	Total current liabilities (Items 25 to 35)	997,620,357	985,290,053

† Excludes returns for Class I Switching and Terminal Companies. Data for this class of roads were included in all published statements prior to January, 1933.

‡ The total net railway operating income in this statement differs slightly from that shown in the monthly statement of revenues and expenses through the exclusion of returns for three subsidiaries of Canadian roads and the inclusion of figures reported by some Class I railways for small system roads.

* Includes payments which will become due on account of principal of long-term debt (other than that in Account 764, Funded debt matured unpaid) within six months after close of month of report.

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Basic 6-Hour Day Sought by Railway Labor Unions

Movement also aims to head off plans of railroads for any early reduction in wages

A movement to bring about the establishment of a six-hour "basic" day in railroad service, and at the same time to head off the plans of the railroads for a reduction in wages by continuing present daily rates for six-hours work, has been undertaken by the executives of the railroad labor organizations. On April 7 Senator Black, of Alabama, author of the 30-hour week bill which was passed by the Senate on April 6 but which does not apply to railroad employees, introduced as S.1181 the bill drafted for the labor executives, providing "that beginning July 1, 1933, six hours shall, in contracts for labor and service, be deemed a day's work and the measure or standard of a day's work for the purpose of reckoning the compensation for services of all employees who are now or may hereafter be employed by agencies and operators of facilities of interstate transportation, including any common carrier by railroad, express company, or freight-forwarding company, or sleeping-car company, which are subject to regulation under the interstate commerce clause of the Constitution of the United States." This is in much the same form as the Adamson eight-hour law, which, however, applies only to train-service employees, but it takes in also the employees of other forms of "interstate transportation" so that it would also apply to truck and bus employees, and provision is made in the bill for a repeal of the Adamson law.

The bill also provides that "pending the revision of existing contracts or the making of new contracts between carriers and their employees (in order to provide for the application of the standard of a day's work hereinbefore provided) in the manner required in the Railway Labor Act, neither existing basic rates of pay, nor any other measures of compensation, as fixed in existing contracts, shall be altered, except by written agreements of the contracting parties, but in the absence of agreement the compensation of employees subject to this act for a standard six-hour day shall not be reduced below the existing standard day's wage."

Another provision is that in the revision of existing contracts, or the making of new contracts, in order to provide for the application of the six-hour day standard it shall be permissible, and shall be construed as a compliance with the requirements of the act, for carriers and their employees to agree upon a limitation of hours of service to an aggregate number of hours of standard service for either one day, or one week, or one month, with the respective limitations of either not more than six hours in one day, or not more than 42 hours in one week, or not more than 180 hours in one month, or the equivalent thereof, but that it shall not be permissible, and shall be construed as a violation of the requirements of the act, to contract for work, or to employ persons or to permit persons to work, in excess of the limitations provided.

The Senate on April 6 passed by a vote of 53 to 30 the bill introduced by Senator Black to prohibit the interstate transportation of commodities or articles produced in establishments where persons are employed or permitted to work more than five days a week or six hours a day. The Senate adopted some amendments making exceptions but voted down, 48 to 41, an amendment offered by Senator Robinson, of Arkansas, to substitute 36 hours a week. Senator Robinson said he thought that in that form the bill would be acceptable to the President. President Roosevelt has asked Secretary Perkins of the Department of Labor and Secretary Roper, of the Department of Commerce, to have a study made as to the effect of the bill, which was to be presented to the House committee to which the bill was referred.

Secretaries Roper and Perkins on April 11 indicated general approval of the principle of the 30-hour week bill but Secretary Perkins said she proposed to suggest several changes to make it more flexible and workable. It was also learned at the White House that the President, after talking it over with them, was inclined to insist upon more elasticity in the bill, although not intending to suggest to Congress any specific maximum number of hours to take the place of the 30 hour limit in the bill.

Bill Based on Salter Findings Presented in Britain

A bill designed to regulate highway carriers of freight in Great Britain has been introduced there in the House of Commons. Provisions of the bill which is entitled "The Road and Rail Traffic Bill" are based upon the findings of the so-called Salter Committee, an investigating body headed by Sir Arthur Salter which filed its report with the British Minister of Transport in July, 1932.

Railway Employment Again Reduced

A further reduction in the number of railway employees in the service of Class I railways occurred between January 15 and February 15, according to the Interstate Commerce Commission's monthly compilation. The total as of the middle of February was 941,514, excluding switching and terminal companies, as compared with 946,005 in January. As compared with February last year this was a reduction of 12.47 per cent.

Modern Trends in Motive Power

W. C. Dickerman, president of the American Locomotive Company, will address the New York Railroad Club meeting Friday evening, April 21, on "Modern Trends in Railway Motive Power." Present day demands have caused radical changes in the methods of handling railway traffic and the motive power must be designed to suit these conditions. Mr. Dickerman will review the trends in motive power progress during the past quarter century and will indicate some of the tendencies of the future.

Two More States Enact Motor Regulation Laws

North Dakota and Indiana acts designed to extend control over highway carriers

Legislation providing for additional regulation of common and contract motor carriers and assessing such carriers for their use of public highways has been passed by the legislatures of North Dakota and Indiana. In North Dakota three laws were passed—one providing for the supervision and regulation by the Board of Railroad Commissioners of the transportation of persons and property for compensation by motor vehicles, the second providing for the taxation of motor vehicles using the highways for commercial purposes and the third fixing size and weight limitations for motor vehicles operating for hire; in Indiana six bills were passed, the principal ones being that providing for the regulation of contract motor carriers, that prescribing hours of service for drivers employed in highway transport and that assessing motor carriers for their use of the highways.

The North Dakota regulatory bill, dealing first with common carriers, invests the Board of Railroad Commissioners with authority over such carriers, which authority extends to the granting of certificates of convenience and necessity the fixing of rates and classifications of freight, the regulation of facilities, accounts, service, abandonments and safety of operations, the fixing of schedules to meet the needs of communities served and the prevention of substantial duplication of service between highway common carriers and competing steam and electric railroads so as "not to substantially substitute the operation of motor common carriers for existing steam or electric transportation facilities." Another stipulation provides that rates of motor common carriers shall be just and reasonable and forbids departures from published rates. The commission may deny a certificate to a motor carrier if it finds services furnished by existing transport facilities adequate for the territory involved.

Contract carriers in North Dakota are required under the law to obtain permits and no such permit "shall be granted unless the applicant has established to the satisfaction of the commission that the privilege sought will not endanger the safety of the public or interfere with the public use of the public highways or impair the condition or maintenance of such highways directly, or indirectly by impairing the efficient public service of any authorized common carrier or common carriers then adequately serving the same territory." Thus the commission is empowered to prescribe for contract carriers "minimum rates.....which shall not be less than the rates prescribed for common carriers for substantially the same service."

Other sections of the act prescribe liability bond requirements and fix hours of service of drivers. Under the latter provision it becomes unlawful for any common or contract carrier to require or per-

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NEW OPERATING METHODS *have made* OLD POWER OBSOLETE

A relatively few modern locomotives are carrying the burden of present-day operation.

Back of these modern locomotives are thousands of others — obsolete and unfit to meet the demands of modern transportation.

Most of them were built before the days of long runs, high speed freight trains, and other modern developments.

How, then, can these obsolete locomotives be expected to perform efficiently and economically? They cannot. More of the modern locomotives are needed if the railroads are to maintain their improved service and do so at a profit.

LIMA LOCOMOTIVE WORKS, INCORPORATED

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Temporary Continuance of Seatrain Service Authorized

The Shipping Board on April 7 authorized the Seatrain Lines to continue to carry on coastwise traffic between the ports of New York and New Orleans via Havana, in its new Seatrain vessels, for a period beginning April 6 and continuing thereafter until 30 days after the effective date of the final orders of the Interstate Commerce Commission in the investigation proceedings still pending before it. The company has been operating since October 6 under a similar temporary authorization, which was modified on December 21. Upon the making of the final orders of the commission, according to the Shipping Board resolution, the Seatrain company is at liberty to make such further application as the circumstances in the case may require, and the board reserves the right to alter, modify, or rescind the authorization upon such terms and conditions as it may fix.

The Interstate Commerce Commission has postponed from April 17 to April 24 the date for resuming hearings before Examiner Boles in connection with its investigation of the Seatrain affairs.

SELECTED INCOME AND BALANCE-SHEET ITEMS OF CLASS I STEAM RAILWAYS†

Compiled from 143 reports (Form IBS) representing 148 steam railways
TOTALS FOR THE UNITED STATES (ALL REGIONS) ‡

For the month of January 1933	1932		
		Income Items	
$13,360,619	$11,301,679	1. Net railway operating income.	
13,924,325	15,306,580	2. Other income.	
27,284,944	26,608,259	3. Total income.	
10 535,416	10,228,674	4. Rent for leased roads.	
44,362,929	43,789,606	5. Interest deductions.	
1,989,005	2,028,466	6. Other deductions.	
56,887,350	56,046,746	7. Total deductions.	
d 29,602,406	*d 29,438,487*	8. Net income.	
		9. Dividend declarations (from income and surplus):	
45,000	120,200	9-01. On common stock.	
289,912	695,959	9-02. On preferred stock.	

BALANCE-SHEET ITEMS

		Balance at end of January 1933	1932
	Selected Asset Items		
10.	Investments in stocks, bonds, etc., other than those of affiliated companies (Total, Account 707)	$766,948,976	$795,464,755
11.	Cash	272,885,202	279,274,837
12.	Demand loans and deposits	32,225,387	44,856,088
13.	Time drafts and deposits	35,138,636	36,285,398
14.	Special deposits	22,641,696	47,308,266
15.	Loans and bills receivable	13,294,697	14,179,572
16.	Traffic and car-service balances receivable	43,594,175	49,955,312
17.	Net balance receivable from agents and conductors	35,926,074	41,227,248
18.	Miscellaneous accounts receivable	133,267,547	159,747,537
19.	Materials and supplies	315,085,937	370,999,452
20.	Interest and dividends receivable	31,483,835	31,659,503
21.	Rents receivable	1,797,988	2,020,813
22.	Other current assets	9,543,124	14,082,150
23.	Total current assets (Items 11 to 22)	946,884,298	1,091,596,176
	Selected Liability Items		
24.	Funded debt maturing within six months*	228,610,160	95,588,448
25.	Loans and bills payable	304,973,676	258,358,513
26.	Traffic and car-service balances payable	57,595,062	67,328,617
27.	Audited accounts and wages payable	201,738,065	245,494,979
28.	Miscellaneous accounts payable	56,981,503	50,892,606
29.	Interest matured unpaid	163,802,727	134,624,851
30.	Dividends matured unpaid	9,009,932	14,218,594
31.	Funded debt matured unpaid	54,195,701	52,397,661
32.	Unmatured dividends declared	7,640,375	14,580 371
33.	Unmatured interest accrued	108,828,874	107,660,794
34.	Unmatured rents accrued	21,936,479	21,378,757
35.	Other current liabilities	10,917,963	18,354,310
36.	Total current liabilities (Items 25 to 35)	997,620,357	985,290,053

† Excludes returns for Class I Switching and Terminal Companies. Data for this class of roads were included in all published statements prior to January, 1933.

‡ The total net railway operating income in this statement differs slightly from that shown in the monthly statement of revenues and expenses through the exclusion of returns for three subsidiaries of Canadian roads and the inclusion of figures reported by some Class I railways for small system roads.

* Includes payments which will become due on account of principal of long-term debt (other than that in Account 764, Funded debt matured unpaid) within six months after close of month of report.

d Deficit.

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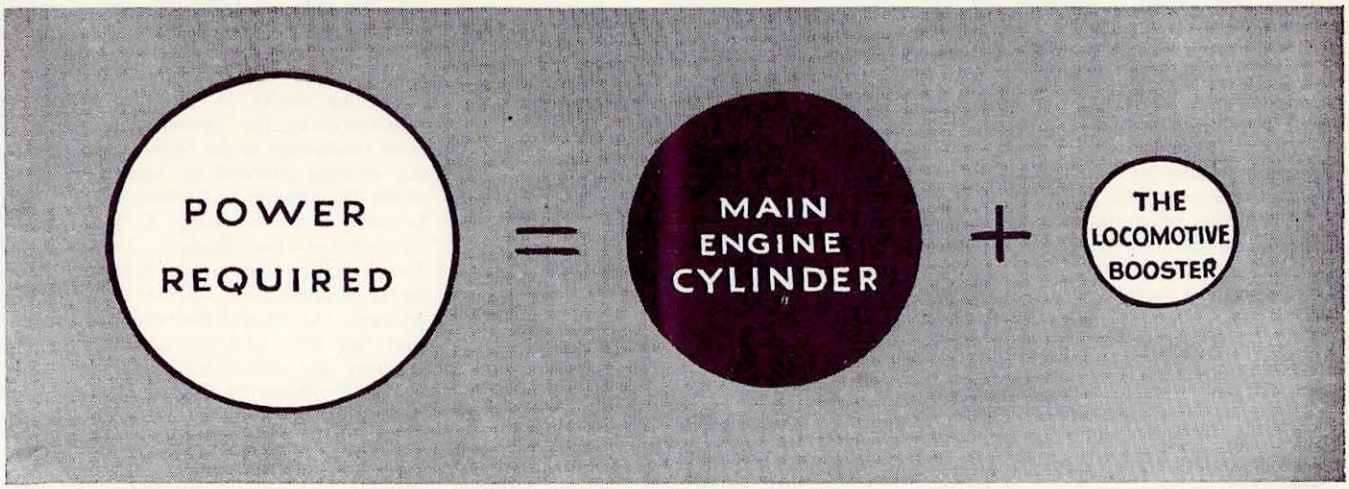
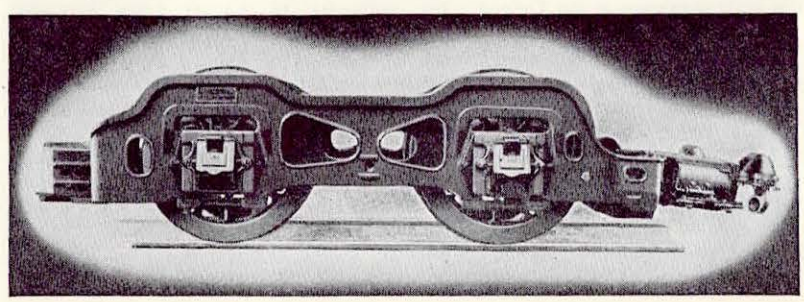
DESIGN The Locomotive Around THE BOOSTER And Save Maintenance



IF a locomotive cylinder must be made large to give the needed power at low speeds it is too big for road speeds. Because the big cylinder is used continuously there is no chance to cut down on the work done and hence cut down on maintenance. You are still paying the full maintenance whether or not you are working to capacity. « But if the locomotive is designed to employ a combination of a smaller cylinder plus The Locomotive Booster to secure the equivalent power at low speeds, the Booster power can be cut out as speed increases and the smaller cylinders will then carry the load. Smaller cylinders naturally mean lower maintenance due to a reduction in the amount of work done. « Take full advantage of all the economies of The Locomotive Booster and incorporate it in the original design.

FRANKLIN RAILWAY SUPPLY COMPANY, Inc.

NEW YORK CHICAGO MONTREAL



Wage Hearings Open in Canada

The Board of Conciliation, which is considering the proposal of the Canadian railways to reduce wages of trainmen, enginemen and operators by 20 per cent, held hearings in Montreal last week. The railways' contention was that, although they have adopted every possible form of economy in operating methods, their principal revenues and major expenses are dependent on train movements, and it is essential that the wages of those performing this service be reduced. The board is composed of Mr. Justice G. F. Gibsone, of Quebec, chairman; G. C. McDonald, Montreal, representing the companies, and W. F. O'Connor, Toronto, representing the employees.

A. J. Hills, assistant to the vice-president C.N.R., in presenting a statement by the vice-presidents of both railroads, said that operating expenses had been reduced in a continuous effort to offset as far as possible the continuing decline in revenues, but the point had been reached where to maintain services essential to the public cooperative measures were being adopted and further economy had to come in the form of reductions in the rates of wages which comprised such a large proportion of the expenses of operation.

"The returns of the two railways combined for January and February 1933 show a contraction in gross revenues of $9,196,391 or 23.1 per cent for the corresponding two months in 1932," he said, "and while operating expenses including taxes were cut by $6,792,500 or 16.3 per cent the loss from railway operations, after deducting only operating expenses and taxes was $4,157,858, without payment of any interest charges. This compares with a loss in the same two months of 1932 of $1,753,967, or a worse net showing of $2,403,891 for the two months.

"In the face of those figures and in view of the results since the depression commenced to make itself felt we are forced to the decision that necessity demands a further reduction of 10 per cent from the compensation of the employees embraced in our application."

Even with the additional ten per cent wage cut, it was pointed out by George Hodge, manager of the personnel department of the C. P. R., the decrease would amount only to 22.9 per cent of peak rates in 1920 and 16.8 per cent of the scale of 1921. On the other hand, there had been a great falling off in the cost of living since that time.

Comparing the wages of Canadian railroad men with wages for similar classes employed in the United States, Senator James Murdock for the employees pointed out that from 1928 until about a year ago Canadian railroad men were generally working at a wage rate some 6½ to 7 per cent below the scale obtaining in the United States.

Effective December 1, 1931, the wages of Canadian railroad men were reduced 10 per cent by a deduction from the various payrolls. On February 1, 1932, the wages of American railroad men were reduced in equal proportion, and thus the wages of Canadian railroad men were continued at about 6½ per cent to 7 per cent below rates paid in the United States.

In the month of December, 1932, it was agreed in Chicago that the 10 per cent wage reduction should be continued in the United States to October 31, 1933, subject to notice from either party on or after June 15, 1933, and this condition is now in effect. Senator Murdock stated that Canadian National employees on United States lines west of Detroit and St. Clair Rivers, and in New England come under the Chicago agreement. Why, he asked, should Canadian employees of the Canadian National Railways be less favorably dealt with?

"Canadian railroad men," he said, "have before them at present a proposal to reduce wages by 20 per cent on the basic rates, which if successful would place Canadian railroad men on a wage rate basis of some 17 per cent below their American fellows. The railroads do not expect to secure rails, ties, engines, cars, or dining car supplies at less than the going market rate of price and the question naturally arises, why expect to secure human labor at less than current rates?"

Inland Waterways Corporation Reports Increased Net

The Inland Waterways Corporation in 1932 had a net income of $470,140, as compared with $269,350 for 1931, according to the annual report of Major General Thomas Q. Ashburn, chairman and president, to the Secretary of War. This increased the credit balance carried to the balance sheet to $617,031. Total operating revenues for the year amounted to $6,131,346 as compared with $6,347,287 in 1931, but operating expenses were reduced to $5,607,365, as compared with $5,965,739 in 1931, and the operating income was $595,867 against $381,548 in 1931. General Ashburn, in his remarks accompanying the statistical report, says the year has been marked "by more severe and concentrated attacks upon the Inland Waterways Corporation than any year in its history" and thinks that the primary reason for this is that "the corporation is actually making a net profit." The total tonnage forwarded and received by all divisions was 1,572,869, as compared with 1,481,751 in 1931 and 1,758,244 in 1928, which was the peak year.

I. C. C. Denies Some Reduced Fare Applications

The Interstate Commerce Commission has denied a fourth section application of the St. Louis-San Francisco for authority to establish reduced passenger fares between St. Louis and Kansas City and Birmingham, Ala., and Pensacola, Fla., without observing the aggregate-of-intermediates clause of the long-and-short-haul law. Similarly the commission had denied the Baltimore & Ohio's application for authority to reduce fares between Louisville, Cincinnati and St. Louis to meet the competition of the 2-cent fares established by the Louisville & Nashville without making corresponding reductions at intermediate points. The Baltimore & Ohio later filed another application covering fares between stations on its line from Cincinnati to Louisville, from St. Louis to Louisville, and from St. Louis to Cincinnati.

Railroad Legislation Still Under Study

President Roosevelt's plan of emergency railroad legislation is still expected to be ready for submission to Congress in a special message shortly, although progress in completing the details has been slower than had been hoped for and the numerous complications which the planning has encountered have afforded an opportunity for opposition to develop from several directions while it was still in the formation stage. Further delays are anticipated after the bill gets to Congress and probably hearings will be held before Congressional committees on some phase of the proposed legislation.

Various drafts of the proposals were considered by the President at a three-hour conference at the White House Monday evening attended by Secretary Roper, of the Department of Commerce, Secretary Woodin, of the Treasury, L. W. Douglas, director of the Budget, Commissioner Joseph B. Eastman, of the Interstate Commerce Commission, and Dr. W. M. W. Splawn. Afterward Secretary Roper said that "we hope to bring these drafts into concrete and consolidated form for action by the President by the latter part of the week."

It is understood that the principal features of the plan still contemplate the creation of a federal railroad co-ordinator, amendment of the law under which loans have been made to railroads by the Reconstruction Finance Corporation, a new rate-making rule in place of the fair return and recapture provisions of Section 15a, and amendment of the consolidation law to give the Interstate Commerce Commission complete supervision of railroad acquisitions by carriers, individuals and holding companies.

Secretary Roper said at a press conference on Wednesday that he and the committee had heard many people and had received many plans and legislative proposals which had been reduced to about four legislative suggestions or tentative bills. The President had heard them and had asked the committee to see if it could not bring them into a composite measure and the committee was at work with that end in view. It was somewhat uncertain when the committee could report back to the President but the members of the committee, Secretaries Woodin and Roper, Commissioner Eastman and Dr. Splawn, and the chairman of the Senate and House committees on interstate commerce were to meet again on Thursday. The major point still being considered involved the extent of the powers to be conferred upon the federal co-ordinator. The other matters were regarded as taken care of, in separate bills.

The Reconstruction Finance Corporation announces that A. A. Berle has been added to the executive staff of the corporation in the capacity of special assistant to the directors on railroad matters. Mr. Berle is a lawyer living in New York and was formerly associated with the National Transportation Committee. He has been one of the Presidents advisers recently in connection with the consideration of plans for railroad legislation.

Alfred P. Sloan, Jr., president of General

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. . . $1.00 for arch brick pays for itself ten times

The last course of Arch brick works just as effectively as the other courses. It can be left off only at the expense of an increase in fuel consumption.

The economy of the locomotive Arch was thoroughly established years ago. More recent tests show that every dollar you "save", by cutting down on the length of Arch, costs you ten dollars in the form of increased fuel; net loss nine dollars.

For economy of operation be sure that your locomotives leave the roundhouse with a full arch with every brick in place.

THERE'S MORE TO SECURITY ARCHES THAN JUST BRICK

HARBISON-WALKER REFRACTORIES CO.
Refractory Specialists

AMERICAN ARCH CO.
INCORPORATED
Locomotive Combustion Specialists

Motors Corporation and chairman of the National Highway Users' Conference, headed a delegation of twelve members of the latter organization who asked Secretary of Commerce Daniel C. Roper on April 6 that consideration be given to the views of the highway users of the country in working out the government's transportation program. Emphasis was laid upon their assertion that this group represents the shippers' viewpoint as well as that of those who actually operate motor vehicles. No detailed plan was laid before the Secretary but they offered their cooperation in formulating any plan for the coordination of the country's transportation agencies.

A plan for the reorganization of the Department of Commerce including a provision for the creation of a new Bureau of Transportation and, it is understood, for a reorganization of the Interstate Commerce Commission with an independent status but tied in to some extent with the office of the Secretary of Commerce has been laid before President Roosevelt by Secretary Roper, and is expected to be announced shortly. It is proposed to be made public, when finally decided upon, by executive orders under the new authority conferred on the President by the last Congress, and would become effective unless disapproved by Congress within 60 days.

The Bureau of Transportation would be under the general supervision of an Assistant Secretary of Commerce for Transportation, who would take the place of the Assistant Secretary for Aeronautics, and according to advance reports, would include the functions of the Shipping Board, the Bureaus of Weather and Public Roads from the Department of Agriculture, the Federal Radio Commission, the Bureau of Aeronautics, the Geodetic Survey, the Lighthouse Service, the Bureau of Navigation and Steamship Inspection, the Inland Waterways Corporation, the Naval Observatory, and the National Advisory Committee for Aeronautics. It is understood that the Bureaus of Safety and Locomotive Inspection may be transferred to the new bureau but that the legislative or quasi-judicial functions of the commission would be separated and the independent status of the commission maintained except from an organization standpoint. The Bureau of the Budget has prepared revised estimates for the independent offices appropriation bill, which were to be submitted to Congress this week, and it is reported that these include some heavy reductions, including a drastic reduction in the amount allowed for the commission's Bureau of Valuation.

Barge Differentials Required to be Maintained

The Interstate Commerce Commission has issued a supplemental report accompanied by a modification of previous orders to make it clear that the commission requires that differentials under all-rail freight rates reflected in barge-rail and rail-barge-rail rates heretofore prescribed by it shall be maintained regardless of changes in the level of the all-rail rates. In the course of the past twelve months the rail lines have made many reductions in all-rail rates on account of truck competition and for other reasons and in many instances they have declined to join with the barge lines in revised barge-rail and rail-barge-rail rates on the ground that the commission's orders prescribing differentials under all-rail rates "contemporaneously applicable" must be understood as referring only to the all-rail rates in effect on the dates of the orders. The Inland Waterways Corporation and the Mississippi Valley Barge Line, calling attention to this position of the rail carriers, asked the commission to modify its prior orders to avoid the use of those words. The rail carriers in southwestern and southern territories, objected to the idea of a so-called "floating differential" that could not be changed, but the commission has pointed out that they may apply for a review of the findings as to the differentials if they desire and also that appropriate modifications of the differentials may be brought about by agreement. Commissioner Mahaffie dissented, saying the commission should hold a hearing to ascertain whether the differentials as applied to the new rate levels are still correct.

Delaware & Hudson Suspends A. T. C.

Division 6 of the Interstate Commerce Commission, in an opinion by Commissioner McManamy, has issued an order temporarily suspending the requirements of its automatic train-control orders in so far as they affect this company. The intermittent-inductive device of the General Railway Signal Company was installed between Rouses Point, N. Y. and Whitehall, 116 miles, and later extended from Whitehall to Albany, 76 miles.

The total number of locomotives now fitted with the apparatus is 150. The company's petition avers that because of the falling off of business the automatic train control may properly be put out of service without creation of increased hazard. Elaborate statements are given of the volume of traffic in 1923 and 1931; the record of train movement being given in the shape of a statement of the number of train miles per mile of main track per day for each month. The freight train average for 1923 was 9.23; for 1931 it was 4.97. Passenger mileage 10.57 in 1923 and 9.77 in 1931. The passenger traffic is heavier in the summer than in the rest of the year but in the summer months there are few storms or fogs which interfere with train operation.

The financial statement shows that the return on the company's property investment in 1926 was 7.64 per cent while in 1931 it was only 3.30; and in the first seven months of 1932 there was a net operating income deficit of $215,396.

The probable savings by discontinuance of automatic train control are estimated at $22,629 annually; and there will be a further reduction in expenses due to eliminating undesired brake applications and better use of locomotives. In the past 26 years, no passenger has been killed in a collision on the Delaware & Hudson, and since automatic train control was introduced there have been in A.T.C. territory only ten collisions, nine of which were in yards; and the tenth was not preventable by A.T.C.

Conditions of fog and storm obscuring signal indications prevail only to a very limited extent on this section of the road, the grades are low and speeds are restricted where necessary on curves. The efficiency of the visual signal system and the competency of employees are declared to be such that the likelihood of collisions is reduced to a minimum. The maximum permissible speed is 65 miles an hour.

The conclusion of the commission's report is that, in view of the present reduced volume of traffic the freedom from accident and the apparent effort on the part of the road to modernize its automatic block signal system, and for other reasons, it is found that at the present time conditions do not require automatic train control.

Commissioner Eastman dissents.

Senator Dill Would Make R. F. C. Loans Difficult

Senator Dill, chairman of the Senate committee on interstate commerce, has introduced an amendment to the bill providing for loans from the Reconstruction Finance Corporation to insurance companies proposing amendments to the original R. F. C. act to impose numerous conditions upon loans to railroads. It provides that the R. F. C. shall make no loan to a railroad for the purpose of paying interest on its funded debt, taxes, or wages to "regular" employees not employed on new construction, deferred maintenance, or new equipment, nor until the railroad has provided that for at least two years no official, executive officer or employee shall receive a salary greater than $25,000, nor until the Interstate Commerce Commission shall have fixed the amount of capital stock and bonded debt and the number of vice-presidents and executive officers "which in the opinion of the commission will enable the railroad thereafter to provide for its own capital needs without additional loans for interest, taxes or wages", and also until the railroad has complied with such findings. It is provided that if the amount fixed is less than the capitalization outstanding the railroad may reduce its stock and bonds to that amount either by agreement with its security-holders or by proceedings under the bankruptcy act of March 3. Another provision is that loans made "under this sub-section" shall run for a period not exceeding 15 years and shall constitute a "preferred security" of the railroad. Still another would authorize the R. F. C. to make loans to trustees of railroads "which proceeded to reorganize" under that act.

Wage Statistics for January

Class I railways, excluding switching and terminal companies, reported to the Interstate Commerce Commission a total of 946,005 employees as of the middle of January. This was a decrease of 30,820 under the number reported by the same roads for December, 1932. The decline was largely in the maintenance groups. The total for January was 13.29 per cent less than for January, 1932. The present report is the first to be affected by a modification in the forms on which the wage statistics are reported and notes that the number who received pay at some time during the month was 1,063,408. The total compensation paid in January was $113,950,932, as compared with $146,859,068 in January, 1932.

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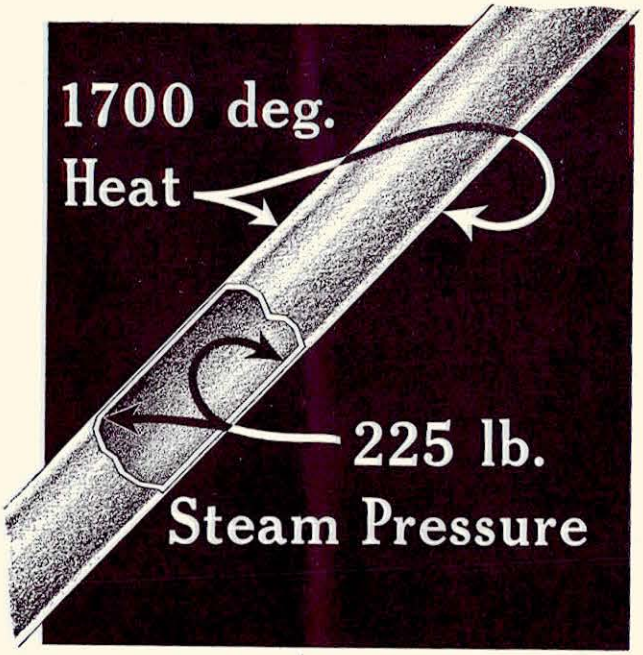

Today's Operating Conditions Require

A NEW DEAL for SUPERHEATER UNITS

It is a generally recognized fact that locomotives are operated today to the limit of their capacity over a shorter period of time than formerly. This condition necessitates heavy general boiler repairs, with more frequent firebox renewals.

Obviously, the performance of superheater units is correspondingly more severe. Increased evaporation, increased pressures, increased gas and steam temperatures all throw heavier duty on the superheater units . . . . consequently, different and more exacting maintenance methods are required. Patch repairing them at general shopping, or replacing only those in bad condition is a makeshift at best. A far better way — and the most economical in the long run — is to have them rebuilt through the Elesco unit remanufacturing service.

This service restores superheater units to a condition practically equal to new — at much less cost — and guarantees renewed service life to meet today's operating conditions.

THE SUPERHEATER COMPANY

60 East 42nd Street
NEW YORK

ELESCO

Peoples Gas Building
CHICAGO

Canada: The Superheater Company Limited, Montreal

A-774

Superheaters - Feed Water Heaters - Exhaust Steam Injectors - Superheated Steam Pyrometers - American Throttles

Supply Trade

Raymond F. Garcia has been appointed general manager of sales, universal pipe division, of **The Central Foundry Company,** with headquarters at New York, succeeding **Leonard W. Saine,** who has resigned to go into other business.

Julius Kindervater has been appointed manager of the Alco plant of the **American Locomotive Company,** Richmond, Va., vice **George Gurry,** resigned. Mr. Kindervater will continue to handle matters pertaining to the office of mechanical superintendent.

Cyrus J. Holland, formerly representative of the **Wine Railway Appliance Company,** with headquarters at Chicago, has opened an office in the Peoples Gas building of that city to engage in the sale of a combination helical-volute truck spring for railway cars.

Neil C. Hurley, chairman of the executive committee of the **Independent Pneumatic Tool Company,** Chicago, has been elected president, to succeed **R. S. Cooper,** who has been made vice-president in charge of the eastern territory, with headquarters at New York, succeeding **Robert T. Scott,** retired.

At the annual meeting of stockholders of the **Westinghouse Electric & Manufacturing Company** on April 12 at East Pittsburgh, Pa., **David K. E. Bruce, Paul D. Cravath,** and **Marshall Field,** directors, whose terms expired on April 12, were re-elected. **C. A. Terry,** honorary vice-president, was elected a director for a four-year term and **Warren H. Jones,** secretary, was elected to complete the term made vacant by the death of **E. M. Herr,** late vice-chairman of Westinghouse.

OBITUARY

J. F. Sattley, sales representative for the Chicago district of the Winton Engine Corporation, which recently absorbed the Electro-Motive Company, died in Chicago on April 7 following an operation.

Equipment and Supplies

PASSENGER CARS

Chesapeake & Ohio.—Work is now under way installing the air-conditioning system of the Pullman Car & Manufacturing Corporation on equipment of all through passenger trains of this road.

IRON AND STEEL

The New York Central has authorized the purchase of 8,930 tons of rail.

The Erie has placed orders for 24,549 tons of rail as follows: Carnegie Steel Company, 16,049 tons; Illinois Steel Company, 4,500 tons; Bethlehem Steel Company, 2,000 tons; and Inland Steel Company, 2,000 tons.

MISCELLANEOUS

The Missouri-Kansas-Texas reopened its shops at Parsons, Kan., Sedalia, Mo., and Waco, Tex., on April 1, thus affording employment for 780 mechanics for about three months. According to M. H. Cahill, chairman of the board and president, the Katy's maintenance program for this year will be much larger than last year and will provide considerable additional employment. Extra gangs are now relaying 20 miles of track with new 90-lb. rails south of McAlester.

Construction

Boston & Maine—Delaware & Hudson.—The New York Public Service Commission has approved specifications and an estimate of cost of $54,718 for the elimination of the Elnora and Dyers crossings of the Boston & Main and the Delaware & Hudson at Clifton Park, Saratoga county, N. Y.

Lehigh Valley.—A general plan and estimate of cost of $142,000, exclusive of land and property damages, for the elimination of the Main street crossing of this road in Manchester, Ontario county, N. Y., has been approved by the New York Public Service Commission. The Commission also authorized the Lehigh Valley to do certain work in connection with the elimination of this crossing at actual cost (not to exceed $50,832) by direct employment of labor and purchase of materials. This work consists of changing its tracks and signal system, relocating railroad bunk house and restaurant, constructing, maintaining and removing temporary grade crossing, erecting structural steel, removing crossing facilities and closing crossing. This work must be done without interruption of traffic and prior to the award of a contract for the elimination project.

St. Louis-San Francisco.—This company contemplates the construction of an enginehouse at Oklahoma City, Okla., to replace a structure that was recently destroyed by fire.

West Shore.—The New York Public Service Commission has affirmed its order of last May providing for the elimination of the Oak Orchard road and Ford road crossings of this road in Elba, Genesee county, N. Y. The Oak Orchard road crossing is to be eliminated by placing the highway above the railroad at an estimated cost of $85,300 and the Ford road crossing by placing the highway below the railroad at an estimated cost of $118,300.

Press Dispatches from Bogota, Colombia, April 10, report a derailment on the Northeastern Railway, at Ventaquenmada, in the state of Boyaca in which 18 persons were killed and large numbers injured.

Financial

Akron, Canton & Youngstown.—*Reorganization Proposed.*—This company on April 3 filed application in the federal district court at Cleveland, Ohio, asking for postponement of debts pending reorganization of capital structure of the railroad in accordance with the federal bankruptcy act. It stated that $2,500 was due April 1 in interest on the company's general and refunding 6 per cent mortgage bonds and $77,000 interest due on its general refunding mortgage 5½ per cent bonds.

Atlantic Coast Line.—*Bonds.*—The Interstate Commerce Commision has authorized this company to procure the authentication and delivery of $742,000 of series A 4½ per cent general unified 50-year bonds in reimbursement of capital expenditures.

Denver & Rio Grande Western.—*Suit To Set Aside I. C. C. Order Fails.*—The Supreme Court of the United States, in a decision by Justice Butler on April 10, affirmed a decision of the district court for the district of Delaware which had declined to set aside the order of the Interstate Commerce Commission authorizing the acquisition by the D. & R. G. W. of control of the Denver & Salt Lake. Suit for such an order was filed by the Moffat Tunnel League, the Uintah Basin Railroad League and other similar organizations and the highest court held that there is no federal statute that purports to give any unincorporated voluntary association standing to bring such a suit to set aside an order of the commission.

Erie.—*R. F. C. Loan.*—This company has applied to the Reconstruction Finance Corporation for a loan of $1,500,000 to meet fixed interest obligations due May 1 and has also applied to the Interstate Commerce Commission for authority to issue and pledge an additional $5,000,000 of its refunding and improvement mortgage 6 per cent bonds to be used as collateral for this loan and also for a loan from the Railroad Credit Corporation.

Gulf, Mobile & Northern.—*Acquisition.*—This company has applied to the Interstate Commerce Commission for authority to acquire control of the operation of a portion of the line of the Louisiana Southern, between Linwood, La., and New Orleans, 22 miles.

Illinois Central.—*R. F. C. Loan.*—Division 4 of the Interstate Commerce Commission has approved a supplemental application for a loan of $7,137,000 to this company from the Reconstruction Finance Corporation to provide for payments of interest and principal of equipment obligations. The commission last year had approved a loan of $11,000,000 of which $3,863,000 was advanced by the R. F. C. and the company recently asked authority to divert the remainder of the authorization for other uses.

Lehigh & New England.—*Annual Report.*—The 1932 annual report of this company shows net income after interest and

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Alco Alco

TO ECONOMIZE— MODERNIZE

"With an increase in traffic which will require the present stored power to be drawn upon, the ability of the railroads to continue operation at present average speeds will be increasingly jeopardized.

"Freight-train schedules in main-line service approaching passenger-train speeds, which have been responsible for the steadily increasing speed average, are beyond the physical ability of much of the motive power at present owned by the railroads.

"If the older locomotives are returned to service, not only will the service which they perform be directly slowed up, but the ability to utilize the capacity of modern motive power will also be destroyed.

"The retention of the obsolete locomotives will destroy the value of the modern."

From an editorial in the Railway Mechanical Engineer

American Locomotive Company
30 Church Street New York N.Y.

Alco Alco

other charges of $432,041, as compared with net income of $510,921 in 1931. Selected items from the Income Statement follow:

	1932	1931	Decrease
Railway Operating Revenues	$3,274,739	$4,107,459	$832,720
Maintenance of way	404,837	537,190	132,353
Maintenance of equipment	684,212	907,374	223,162
Transportation	1,122,662	1,456,562	333,900
Total Operating Expenses	2,480,537	3,213,363	732,825
Operating ratio	75.75	78.23	2.48
Net Revenue from Operations	794,202	894,096	99,894
Railway tax accruals	48,565	67,921	19,356
Railway operating income	745,628	826,164	80,536
Hire of freight cars—Cr.	196,528	211,636	15,108
Joint facility rents	96,643	118,737	22,094
Net Railway Operating Income	848,845	924,397	75,552
Non-operating income	23,824	28,449	4,625
Gross Income	872,670	952,846	80,176
Interest on funded debt	407,504	412,477	4,972
Total Deductions from Gross Income	440,629	441,925	1,296
Net Income	432,041	510,921	78,881

LOUISVILLE & NASHVILLE.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon a line extending from Princeton Junction, Tenn., to Gracey, Ky., 32 miles. Freight traffic on the line decreased from 22,822 tons in 1928 to 6,561 tons in 1932. The principal products moving out of the territory are wheat, tobacco and livestock, most of which traffic has deserted the railroad for trucks. Gross revenues of the line were $63,840 in 1928 and $14,814 in 1932, and it could be kept in operation only by expensive rehabilitation of bridges. Tax accruals in 1932 totaled $7,555.

MISSOURI-KANSAS-TEXAS.—*New Directors.*—At the annual meeting of stockholders of this company, William M. Greve, president of New York Investors, Inc., New York, and Matthew S. Sloan, also of New York, were elected directors to succeed H. E. McGee, executive vice-president of the Katy, and R. G. Babbage.

NATCHEZ, COLUMBIA & MOBILE.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon its entire railroad extending from Norfield, Miss., to Tilton, 29.6 miles, and the abandonment of operation under trackage rights over the railroad of the Denkmann Lumber Company between Tilton and Oakvale, 3.6 miles. The abandonment is due to the closing of the plant of the lumber company which it served and to truck competition for other traffic existing in the territory.

NEW YORK, NEW HAVEN & HARTFORD.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to issue and pledge $7,500,000 of first and refunding mortgage 20-year gold bonds, to reimburse the treasury for capital expenditures.

NEW YORK CENTRAL.—*Bonds.*—The Interstate Commerce Commission has authorized the Boston & Albany to issue $7,000,000 of refunding bonds of 1933 to meet a maturing issue of similar amount of its 25-year 4 per cent improvement bonds of 1928. The refunding issue is to be guaranteed by the New York Central, which proposes to borrow the funds needed to meet the maturity from the Reconstruction Finance Corporation, pledging the bonds as collateral security.

NORFOLK & WESTERN.—*Trackage Rights.*—The Interstate Commerce Commission has authorized this company to operate under trackage rights over the Little Miami, the Pittsburgh, Cincinnati, Chicago & St. Louis, and the Pennsylvania (the operating company) from a point near Clare, Ohio, to a connection of the Baltimore & Ohio at East Norwood, 5.3 miles—the purpose of the trackage rights being to permit the entrance of the Norfolk & Western into the new Cincinnati Union Terminal.

PENNSYLVANIA.—*Supreme Court Sustains I. C. C. Order.*—The Supreme Court of the United States, in a decision by Justice Butler on April 10, affirmed the decision of the district court for the southern district of New York which had declined to set aside an order of the Interstate Commerce Commission authorizing an agreement between the Pennsylvania and the Long Island for the use by the latter of the Pennsylvania's terminal property in New York City. The commission's order was attacked by the New York Transit Commission.

ST. LOUIS-SAN FRANCISCO.—*Abandonment.*—The receivers have applied to the Interstate Commerce Commission for authority to abandon part of a branch line between McDougal, Ark., and Tipperary, 8.9 miles.

SANTA FE NORTHWESTERN.—*R. F. C. Loan Denied.*—Division 4 of the Interstate Commerce Commission has denied approval of this company's application for a loan of $228,824 from the Reconstruction Finance Corporation.

SANTA FE, SAN JUAN & NORTHERN.—*R. F. C. Loan.*—The receiver has applied to the Reconstruction Finance Corporation for a loan of $50,000.

TONOPAH & GOLDFIELD.—*R. F. C. Loan.*—Division 4 of the Interstate Commerce Commission has approved a loan of $20,000 to the receivers from the Reconstruction Finance Corporation on their application for $30,000 to pay past-due taxes and to provide ties for replacements.

Average Prices of Stocks and of Bonds

	Apr. 11	Last week	Last year
Average price of 20 representative railway stocks	24.21	23.05	18.57
Average price of 20 representative railway bonds	53.34	52.53	58.84

Dividends Declared

Minneapolis, St. Paul & S. S. Marie.—Leased Lines.—Dividend omitted.

Morris & Essex Extension.—$2.00, semi-annually, payable May 1 to holders of record April 22.

Piedmont & Northern.—75c, quarterly, payable April 10 to holders of record March 31.

Pittsburgh, Bessemer & Lake Erie.—Common, 75c, semi-annually, payable October 1 to holders of record September 15.

Reading Company.—25c, quarterly, payable May 11 to holders of record April 18.

Virginian.—Preferred, $1.50, quarterly, payable May 1 to holders of record April 15.

Railway Officers

EXECUTIVE

Titus Becomes President of Illinois Terminal

Andrew P. Titus, vice-president and general manager of the Illinois Terminal, has been elected president and will also retain the title of general manager, with headquarters as before at St. Louis, Mo. Mr. Titus succeeds L. E. Fischer, who has resigned to devote his time to his duties as vice-president in charge of operations of the parent company, the North American Power & Light Company. J. F. Fogarty has been elected chairman of the board of the Illinois Terminal, with headquarters at Chicago, to succeed Clement Studebaker, Jr., deceased. Allen Van Wyck has been elected vice-president of the Illinois Terminal at Chicago, with jurisdiction over legal matters.

FINANCIAL, LEGAL AND ACCOUNTING

Bradley T. McCoy has been appointed treasurer and assistant secretary of the Western Maryland, with headquarters at Baltimore, Md.

A. L. Quast has been appointed auditor of disbursements of the Pere Marquette, with headquarters at Detroit, Mich., to succeed **H. F. Brahany,** who has become auditor of disbursements of the Chesapeake & Ohio, with headquarters at Richmond, Va.

E. C. Craig, general solicitor of the Illinois Central, with headquarters at Chicago, Ill., has been promoted to general counsel succeeding **R. V. Fletcher,** vice-president and general counsel, who resigned recently to become general counsel of the Association of Railway Executives. **V. W. Foster,** general attorney has been appointed general solicitor succeeding Mr. Craig.

PURCHASES AND STORES

A. W. Dayton, general storekeeper of the Northwestern Pacific with headquarters at Tiburon, Cal., resigned April 5.

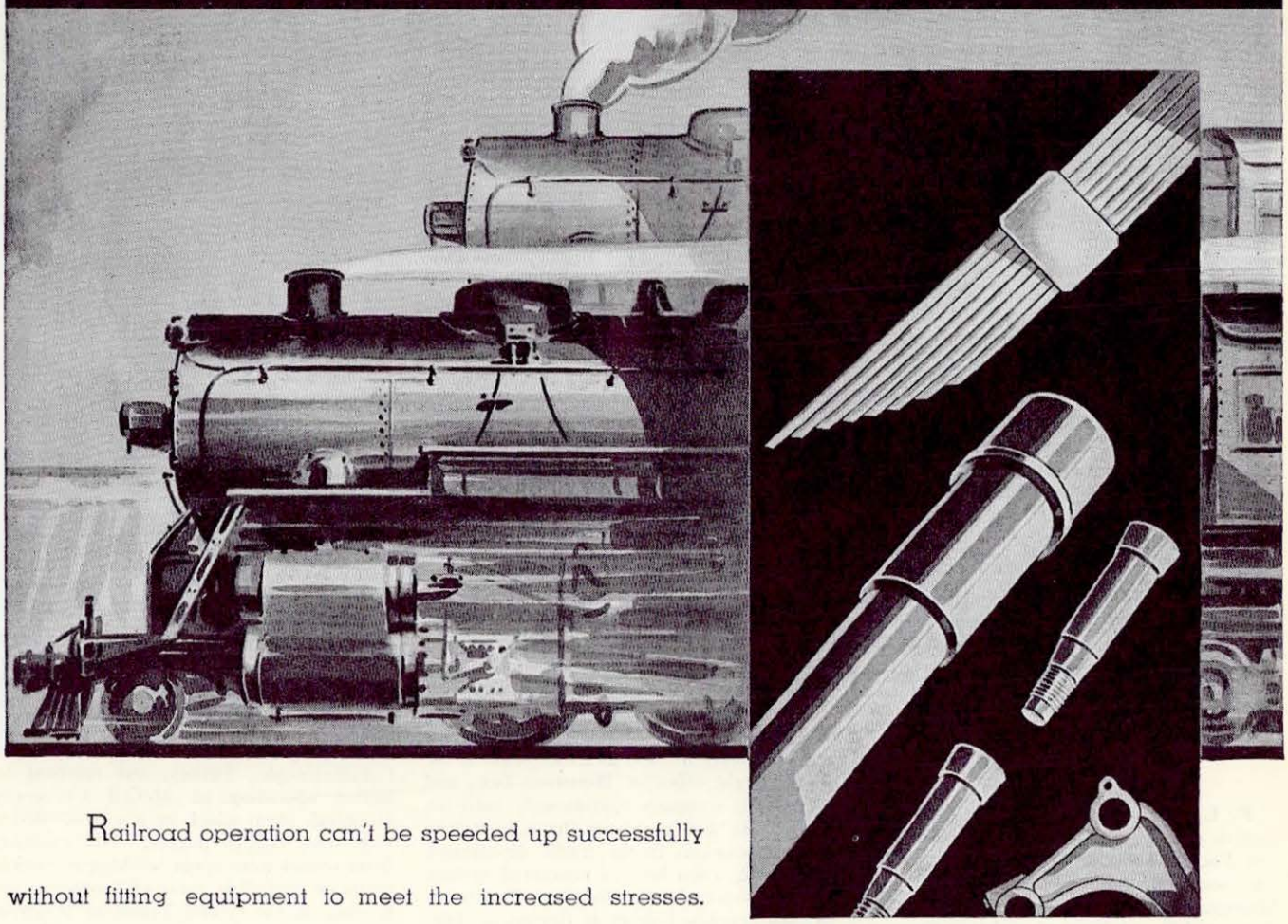
OPERATING

J. E. Rabago, general storekeeper of the Mexican Railway, with headquarters at Apizaco, Mex., has been appointed acting general superintendent of transportation, with headquarters at Mexico City, to take the place of **C. I. Luque,** deceased.

K. C. Marshall, senior assistant superintendent on the Southern Pacific Lines in Texas and Louisiana, has been appointed assistant superintendent with headquarters as before at Houston, Tex., and the position of senior assistant superintendent has been abolished. **T. H. Meeks,** assistant superintendent with headquarters also at

Continued on next left-hand page

SPEEDING UP A RAILROAD CALLS FOR NEW MATERIALS



Railroad operation can't be speeded up successfully without fitting equipment to meet the increased stresses. « Materials that may be all right for train speeds of 15 miles per hour fall down when speeds rise to 45. « To meet these requires better material. It exists in Agathon Alloy Steel. « Agathon Alloy Steels develop such a wide range of physical properties that some one steel will satisfy every railroad need. « Perhaps it's a special spring steel or a shock-resisting steel for axles. Again it may be a non-stretch steel for engine bolts or a special steel for reciprocating parts. « Republic metallurgists have developed an Agathon Alloy Steel for each railroad use. Service has thoroughly proved each one as competent to meet the new demands of increasingly severe service.

Toncan Iron Boiler Tubes, Pipe, Plates, Culverts, Rivets, Staybolts, Tender Plates and Firebox Sheets • Sheets and Strip for special railroad purposes • Agathon Alloy Steels for Locomotive Parts • Agathon Engine Bolt Steel • Agathon Iron for pins and bushings • Agathon Staybolt Iron • Climax Steel Staybolts • Upson Bolts and Nuts • Track Material, Maney Guard Rail Assemblies • Enduro Stainless Steel for dining car equipment, for refrigeration cars and for firebox sheets • Agathon Nickel Forging Steel.

CENTRAL ALLOY DIVISION

REPUBLIC STEEL CORPORATION

MASSILLON OHIO

AGATHON STEELS

Houston, has been transferred to the Dallas-Austin divisions, with headquarters at Austin, Tex., and Ennis. **H. L. Bell,** assistant superintendent at Austin, has been appointed trainmaster with headquarters at Houston.

TRAFFIC

E. S. Ramage and **E. G. Gallagher** have been appointed general agents for the Mississippi Central, with headquarters at Milwaukee, Wis., and Detroit, Mich., respectively.

R. B. Delafield, general agent for the New York, Chicago & St. Louis at Salt Lake City, Utah, has been transferred to the newly-created position of general agent at Denver, Colo.

B. F. McCoy has been appointed general agent for the Ft. Smith & Western, with headquarters at Detroit, Mich., succeeding **William R. Short,** who has resigned.

C. W. Haynes, traveling passenger agent for the Chesapeake & Ohio, with headquarters at Cincinnati, Ohio, has been promoted to the newly-created position of northwestern passenger agent with headquarters at Chicago.

Lewis S. Wickes has been appointed general agent for the Midland Valley, the Kansas, Oklahoma & Gulf, and the Oklahoma City-Ada-Atoka, with headquarters at Oklahoma City, Okla., to succeed **H. S. Humphreys,** who has been transferred to Dallas, Tex., where he replaces **H. D. Fry,** who has resigned.

MECHANICAL

F. L. Carson, assistant superintendent motive power and equipment of the Southern Pacific Lines in Texas and Louisiana, has been appointed master mechanic with headquarters as before at San Antonio, Tex., and the position of assistant superintendent motive power and equipment has been abolished.

SPECIAL

Coincident with the consolidation of accident prevention work on all parts of the Missouri Pacific Lines, the jurisdiction of **C. F. Larson,** superintendent of safety of the Missouri Pacific Railroad, with headquarters at St. Louis, Mo., has been extended to include the Texas and Louisiana properties. **J. P. LaBarge,** superintendent of safety of the Texas and Louisiana lines, has been appointed to the newly-created position of assistant superintendent of safety, with headquarters as before at Houston, Tex.

OBITUARY

Carlos A. Hayes, formerly vice-president in charge of traffic of the Canadian National, died at his home in St. Catharine's, Ont., on March 21. He was 68 years of age.

B. T. Jellison, formerly general purchasing agent of the Chesapeake & Ohio, died on April 7, at Elizabeth City, N. C. Mr. Jellison was born in Indiana County, Pa., on August 11, 1868, and entered railway service with the Pennsylvania in 1887, as a messenger boy.

John E. Baxter, general auditor of the Atchison, Topeka & Santa Fe, with headquarters at Chicago, died on April 11 of pneumonia at St. Luke's hospital in that city. Mr. Baxter was born on August 19, 1869, in Ireland and entered railway service in December, 1889, with the Santa Fe at Topeka, Kan. From February, 1890, until March, 1893, he served as a clerk on the Sonora Railway (then part of the Santa Fe and now a subsidiary of the Southern Pacific) at Guaymas, Mex., and at the end of this period he went with the Atlantic & Pacific (now part of the Santa Fe) as a clerk and traveling auditor at Albuquerque, N. M. Subsequently Mr. Baxter served as traveling auditor and traveling accountant of the Santa Fe Pacific (now also part of the Santa Fe) at Los Angeles, Cal., and in December, 1901, he was appointed traveling accountant on the Santa Fe at Chicago. In April, 1903, Mr. Baxter was made auditor of the Gulf, Beaumont & Kansas City (now the Gulf, Colorado & Santa Fe) at Beaumont, Tex., and in October, 1905, he was promoted to assistant general auditor of the Santa Fe at Chicago, where he was further advanced to general auditor on December 1, 1925.

John W. White, formerly passenger traffic manager of the Missouri-Kansas-Texas, who died at St. Louis, Mo., on March 28, as noted in the *Railway Age* of April 8, was born on September 2, 1878, at Paige, Tex. He entered railway service with the Katy in 1893 as a messenger in the local freight office at Houston, Tex., and served this company continuously until his death. He was promoted through various clerical positions in the traffic department until 1902, when he was appointed cashier and chief clerk in the Houston office, being in 1904 appointed agent at Braunfels, Tex. Three years later he was transferred to Temple, Tex., and in 1910 he was appointed commercial agent, in which capacity he served at various points. In 1918 Mr. White was advanced to division freight agent at Kansas City, Mo., and two years later he was appointed northern traffic representative at Chicago. He was made general freight and passenger agent at Dallas, Tex. on April 15, 1929, and on October 1, 1930, he was promoted to passenger traffic manager with headquarters at Dallas and St. Louis. Because of ill health Mr. White was forced to relinquish the duties of this position and was appointed assistant to executive vice-president on May 16, 1931. On November 1, 1931, he was appointed assistant passenger traffic manager and on February 10, 1932, he was appointed general freight and passenger agent at St. Louis, which position he held until his death.

C. E. Brooks, Canadian National Motive Power Chief, Dies

C. E. Brooks, chief of motive power and car equipment of the Canadian National and prominent railway mechanical engineer, died at his home in Montreal, Que., on April 10, after a short illness. He was 46 years old. Mr. Brooks was president of the Canadian Railway Club in 1924-25 and had been for some time identified with committee work in the Mechanical Division, American Railway Association, and the Railroad Division, American Society of Mechanical Engineers. In connection with the Mechanical Division he was a member of the General Committee and served on the Committee on Locomotive Design and Construction; for the past five years he has been a member of the General Committee of the Railroad Division, A.S.M.E.

C. E. Brooks

As the C.N.R.'s chief of motive power Mr. Brooks became widely-known for his work in developing special types of motive power equipment, including Diesel locomotives.

Mr. Brooks was born July 3, 1886, at Constantinople, Turkey, and received his higher education at McGill University, Montreal, from which he was graduated in 1908 with A.B.S. degree. His vacations from school were spent working in various positions, including those of apprentice and fireman on the Grand Trunk at Montreal. Becoming a machinist after his graduation from McGill, Mr. Brooks went to Western Canada and with the Grand Trunk Pacific worked as locomotive foreman, machinist and shop foreman, general foreman and superintendent of motive power at Rivers and Portage la Prairie, Man., Watrous and Regina, Sask., Wainwright and Edmonton, Alb., and Transcona, (Winnipeg) Man. In 1920 he was appointed mechanical assistant (locomotives) to the operating vice-president, Canadian National, at Toronto, and in 1923 he was transferred to Montreal as chief of motive power for the Canadian National System, taking over also car equipment services in 1932.

An "International Container Bureau" has been established in Paris under the auspices of the International Chamber of Commerce, according to recent reports received by the United States Department of Commerce.

The principal aims of the new organization are to conduct research into the use and development of containers in national and international railway traffic, to promote the use of containers, study their use, and effect closer cooperation between railroads in this connection.

Here's your 1933 POWER-SAVER... MONEY-SAVER

GOODYEAR Power-Saver Cushion Rubber Tires require *53 per cent less pushing than the best previous rubber tires.*

They roll easier than steel—and they wear like steel.

Eye-opening demonstrations have proved to terminal traffic managers that rubber tires are best for Industrial Trucks and Trailers—if the "greatest name in rubber"—Goodyear—is on them.

10 ADVANTAGES

Note Carefully, Please

1 LESS LOAD BREAKAGE
2 LESS NOISE
3 LESS FLOOR WEAR
4 LONGER BATTERY LIFE
5 REDUCED BATTERY CHARGES
6 EASIER STARTING
7 LOWER ROLLING RESISTANCE
8 GREATER SPEED
9 MORE TRIPS PER DAY
10 REDUCED VIBRATION

Consult any Goodyear Truck Tire Service Station Dealer as to the right type and size for your needs, or write to Goodyear, Akron, Ohio, or Los Angeles, California.

If you are not yet familiar with these modern, efficient, economy tires, it will profit you to find out about them. In these cost-cutting days they are paying their way in many a well-managed terminal.

GOODYEAR

INDUSTRIAL TRUCK TIRES

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

these six

1

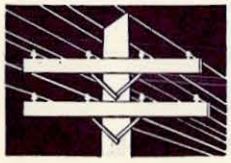
Train Dispatching Equipment— Among Western Electric's latest contributions to improved train dispatching are . . . New Compact Selector Key . . . Jack Box . . . Selector.

2

Train Dispatching Equipment (Continued) — Balanced Armature Type Magnetic Loud Speaker combines clear reproduction with compact size—handy mounting.

Wire and Cable—For vital circuits — dependable wire and cable. A convenient source for all kinds — including Western Electric Lead Covered Cable.

3

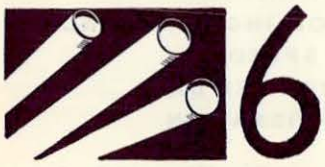


4

Line Construction Materials— From pliers to poles, construction materials of all kinds may be ordered, shipped, and assembled economically and conveniently.

Lamps and Lighting Equipment — A complete selection of quality lamps, fixtures, and glassware is readily available from Graybar. Meets exacting railroad needs.

5



Underground Material—Every type of conduit for railroad use — also conduit fittings, tools, transformers, accessories. No need to seek any further than the nearest Graybar warehouse.

...and 60,000 other quality electrical items for railroads

Graybar

OFFICES IN 75 PRINCIPAL CITIES. EXECUTIVE OFFICES: GRAYBAR BLDG., N.Y.

MAGNUS COMPANY

(INCORPORATED)

Journal Bearings

AND

Bronze Engine Castings

New York Chicago

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AN INVESTMENT
When you put your money into KERITE you make an investment in service. You do more than buy conductors, insulation and protection. You obtain the best possible combination of the most desirable qualities in permanent form. KERITE remains long after the price is forgotten.
THE KERITE INSULATED WIRE & CABLE COMPANY INC
NEW YORK CHICAGO SAN FRANCISCO

The NEW "AB" FREIGHT BRAKE

TAKES ITS PLACE WITH OTHER MAJOR IMPROVEMENTS

THE new "AB" freight brake overcomes limitations of the present equipment and fulfills present-day operating requirements. It makes possible the safe, expeditious, and efficient handling of trains of modern length . . . Its service action is fast, positive, and effective, providing prompt and adequate control . . . Its release function is improved so as to prevent stuck brakes, flat wheels, burned brake shoes, etc. . . . Its emergency action is faster, more powerful, and always available, providing effective and smooth control whenever needed . . . It will interchange with present "K" equipment, and the performance of the latter is improved in proportion to the number of "AB" brakes in a train.

By virtue of its unique performance and maintenance characteristics this new brake takes its place among other major improvements that have been effected to reduce the cost of transportation; it will enable the railroads to obtain the full benefit from their investments in other outstanding improvements.

Subsequent advertisements will amplify the distinctive advantages of this new brake.

This advertisement is No. 1 of a series

WESTINGHOUSE AIR BRAKE CO.

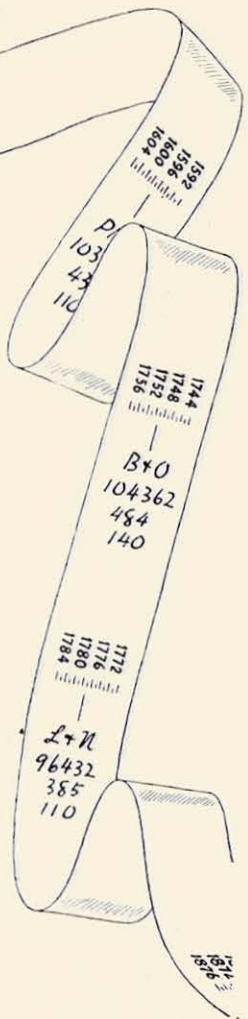
GENERAL OFFICE *and* WORKS

WILMERDING, PA.

(1135)

THIS TAPE*

saved a Railroad $1600 per Month



or a total of $19,200 in a single year in weighing one commodity on a single railroad track scale by using a

STREETER-AMET

Automatic

Weight Recording

Attachment

These figures, computed by the company's weighman against a transfer road's hand weights of the same tonnage, prove that

Economy, Speed and Accuracy

result from the use of this automatic weight recording machine.

Railroads May Rent

Streeter-Amet Automatic Weight Recorders **for easy and quick attachment to any beam scale at surprisingly low monthly cost, and receive full engineering, inspection and maintenance service free of charge. Further information, including, "The Costliest Mileage on Your System", sent on request.**

*These weights may be recorded on cards, if desired.

Write Today

STREETER-AMET COMPANY, 4101 Ravenswood Ave., Chicago, Ill.

Please send me descriptive and testimonial literature, including,

☐ **"The Costliest Mileage on Your System."**

☐ **Have your engineer call with details, without obligation to us.**

Your Name ..... **Title** .....

Name of Company .....

Address .....

A. R. A. STANDARD COUPLERS

Including

SWIVEL COUPLERS

With

SWIVEL BUTTS

Or

SWIVEL YOKES

Pitt Passenger Couplers

STEEL CASTINGS

McConway & Torley Corporation

Pittsburgh, Pa.

PAKRING METAL

THE STRONG, LONG LIVED WEARING METAL

LOCOMOTIVE CYLINDERS AND CYLINDER PARTS FINISHED AND ROUGH

The John Seaton Foundry Co.

The Locomotive Finished Material Co.

ATCHISON, KANSAS

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FLEXIBLE CONDUITS in place of Steam Hose

CONTROLS for Air Conditioning

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VAPOR CAR HEATING CO., Inc.

RAILWAY EXCHANGE, CHICAGO

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YOUNGSTOWN Corrugated Steel Freight Car Doors
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1,300,000 cars equipped
ROLLER SIDE-BEARINGS
STANDARD CAR TRUCK CO.
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EDGEWATER STEEL COMPANY
PITTSBURGH, PA.
Details of our products appeared in the following issues of Railway Age during 1931, 1932 & 1933:
1931—May 16—June 13—July 4—Aug. 1, 8, 15, 22, 29—Sept. 5, 12—Oct. 3—Dec. 5.
1932—Jan. 2—March 5—April 2—May 7—June 18, 25—Sept. 3.
1933—Feb'y 4, 25—March 4—April 1.

WINE RAILWAY APPLIANCE CO.
TOLEDO, OHIO
Details of our products appear in following issues of Railway Age during 1932
January 16—March 19—May 21—August 13—September 17—November 19—or Railway Mechanical Engineer.

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RAIL ANTI-CREEPER
THE P. & M. CO.
CHICAGO NEW YORK
Montreal London Paris Calcutta Sydney

THE BUCKEYE STEEL CASTINGS CO.
COLUMBUS, OHIO
MANUFACTURER of Side Frames and Bolsters for 4-Wheel and 6-Wheel Freight Cars and Locomotive Tenders, A. R. A. Couplers, Yokes and Car Castings.

"DIAMOND-S" BRAKE SHOES
—cost less per mile than other brake shoes
THE AMERICAN BRAKE SHOE & FOUNDRY CO.
230 Park Avenue, New York 332 So. Michigan Ave., Chicago

PROFESSIONAL DIRECTORY

Your name should appear before the readers of this publication.

Robert W. Hunt Company
ENGINEERS
Inspection—Tests—Consultation
All Railway Equipment, Structures and Materials
General Office:
22nd Floor Insurance Exchange
CHICAGO
Offices in all principal cities

GET TOGETHER DEPARTMENT

Non-Display "Employment" Ads five cents a word. Count address in figuring cost. Box number requires ten words. All other classified Ads $4.00 an inch (1" x 1⅝") an insertion. Payable in advance. Railway Age, 30 Church St., New York, N. Y.

Your classified advertisement should appear in this section.

POSITION OPEN

IF YOU are open to overtures for new connection, and qualified for a salary between $2,500 and $25,000, your response to this announcement is invited. The undersigned provides a thoroughly organized service of recognized standing and reputation, through which preliminaries are negotiated confidentially for positions of the calibre indicated. The procedure is individualized to each client's personal requirements; your identity covered and present position protected. Established twenty-three years. Send only name and address for details. R. W. Bixby, Inc., 102 Delward Building, Buffalo, New York.

EDUCATIONAL

THE Railway Educational Bureau, Omaha, Neb., offers a distinctive education service for Supervisors and other employes. Write for FREE Special Bulletin.

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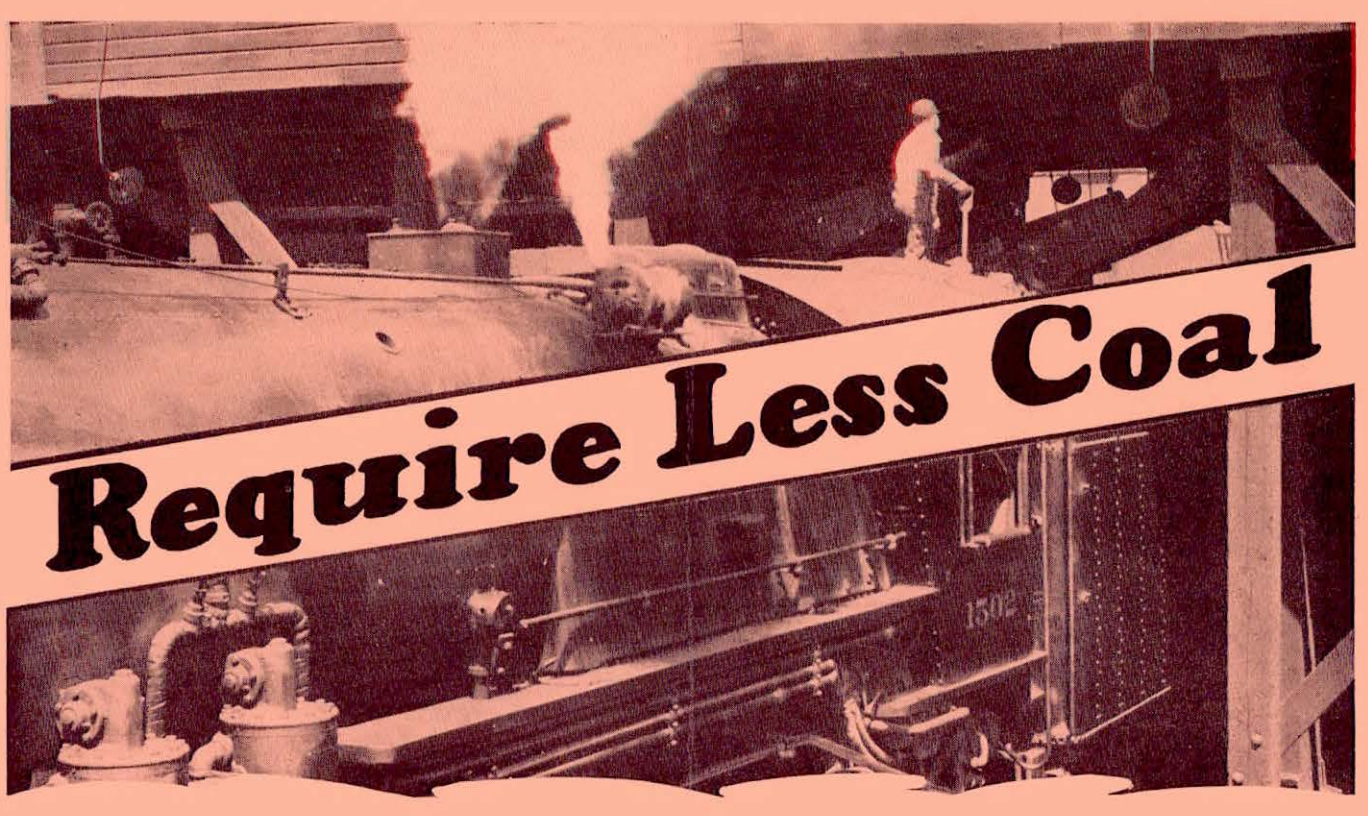

Require Less Coal

THE material used in the valves and cylinders is one of the factors which determine the amount of fuel consumed in operation.

Small leaks by the pistons and valves must be prevented. The job calls for wear-resisting materials which will keep cylinders and valves tight.

Application of HUNT-SPILLER *Air Furnace* Gun Iron Bushings, Bull Rings and Packing Rings in the valves and cylinders will help to reduce fuel expenditures.

Don't let your locomotives blow away their earnings.

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Reg. U. S. Trade Mark
Cylinder Bushings
Cylinder Packing Rings
Pistons or Piston Bull Rings
Valve Bushings
Valve Packing Rings
Valve Bull Rings
Crosshead Shoes
Hub Liners
Shoes and Wedges
Floating Rod Bushings
Parts Finished For Application
Dunbar Sectional Type Packing
Duplex Sectional Type Packing for Cylinders and Valves
(Duplex Springs for Above Sectional Packing)
Cylinder Snap Rings
Valve Rings All Shapes

HUNT-SPILLER MFG. CORPORATION
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Export Agent for Latin America:
International Rwy. Supply Co., 30 Church Street, New York, N. Y.

HUNT-SPILLER GUN IRON

Air Furnace

Centralized Traffic Control

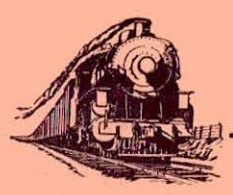
THE Interstate Commerce Commission decision of February 6, 1933 in the matter of automatic train control devices on the Missouri Pacific Railroad included the following important reference to centralized traffic control:

> "In addition to the 50 miles of centralized traffic control between Leeds and Osawatomie, the Missouri Pacific has made similar installations at other points aggregating approximately 155 miles. One of these installations is between Kansas City and Atchison, Kans., 43 miles of single track road, where the traffic is much heavier than between Leeds and Osawatomie. The heaviest traffic operating over this installation is between Edgewater Junction and Cochrane where the average movement is 44 to 54 trains daily. . . .
>
> "Since these centralized traffic control systems have been installed they have been operated with satisfactory results and no accidents have occurred due to failure of enginemen to observe fixed signal indications.
>
> "These installations have eliminated the necessity for heavy expenditures for double tracking operations and have effected a substantial saving in the running time of trains. . . .
>
> "Centralized traffic control accomplishes to some extent the functions of automatic train control. It centralizes the control of trains in the hands of the operator and the engineer; it eliminates all intervening steps; the signal indication which permits a train movement is received at the point where it is to be acted upon; and the engineman does not have to pick up numerous train orders and keep them in mind until executed."

In addition to providing the safety features thus officially recognized, centralized traffic control installations effect substantial savings in operating costs. They are self-liquidating projects.

UNION SWITCH & SIGNAL COMPANY
Swissvale, Pennsylvania

GENERAL RAILWAY SIGNAL COMPANY
Rochester, N. Y.



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Signals Aid Modern Motive Power to Produce More Ton-Miles Per Train-Hour